

FLIGHT

The
**AIRCRAFT
ENGINEER
&
AIRSHIPS**

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1925

- July 8-4 King's Cup Race.
July 26-Aug. 9 Vauville Light 'Plane and Glider Meeting.
Aug. 1-3 Royal Aero Club Race Meeting at Lympne.
Sept. 19-28 F.I.A. Conference at Prague.
Oct. 8 Aero Golfing Soc. Autumn Meeting, Walton Heath.
Oct. 24-29 Schneider Cup Race, Baltimore, U.S.A.

1926

- Aug. Light Aeroplane Competition.

EDITORIAL COMMENT.



The R.A.F. Display

IN writing of the Royal Air Force Display it is difficult to avoid the excessive use of superlatives. As a spectacle the Display was stupendous. As an exposition of finished "airmanship" it was unbeatable; and, finally, the public visited Hendon in such large numbers that the various R.A.F. charities will benefit to a very considerable extent, probably to a very much greater extent even than in previous years. On the whole, therefore, the Display must be voted a huge success from every point of view. Since the years following the War 1914-1918, Great Britain's motto has been, has had to be, "small but efficient." Small the R.A.F. has undoubtedly been, although, fortunately, there are signs that the corner has been rounded, and that from now onwards the Royal Air Force is likely to increase fairly rapidly. With regard to efficiency, if the Display is regarded, as we think it should be, as a demonstration of the degree of efficiency and perfection to which the R.A.F. has attained, then a very high degree of efficiency must be said to have been attained. Probably in this connection one should use the word effectiveness rather than efficiency, since the latter rather indicates ratio of "output" to "input," and what one saw at Hendon on Saturday last was the "output" only. What weeks and months of training had enabled the various events to be carried through with such clocklike precision there was no indication. It is not necessary, however, to possess a very deep knowledge of the subject of flying to realise that before that degree of perfection could be attained the most painstaking care in training and practising must have been required.

Lest it should be thought that we regard the annual R.A.F. Display as being the goal of training, let us hasten to point out that we are under no such misapprehension, and that we fully realise that the Display is but the concentrated demonstration of the

progress which has been made during the year. If, therefore, we prefer to judge the Display from the point of effectiveness rather than efficiency, it is because we realise that, without knowing every detail—in other words, without being in possession of all the factors on the “input” side—it is really impossible to form any idea of the equation expressing the efficiency, but the *effectiveness* of the Royal Air Force could not be doubted for one moment after last Saturday’s wonderful demonstration.

The foregoing remarks apply mainly to the personnel of the R.A.F. In the matter of material the position is not, we are afraid, anything like so satisfactory, and one cannot fail to notice that, although this year a much greater percentage of the machines used were of reasonably modern type, there are still far too many machines of war-time design employed. Surely the time has come when a personnel so nearly perfect as the R.A.F. seems to be ought to be equipped with machines worthy of their pilots. It is no exaggeration to say that of practically all types of aeroplanes—good in ways as they are—used in the Display there is no one which could not be replaced by a better machine if our designers and constructors were given a free hand instead of being hampered in all directions. When the Air Ministry has realised this fact, and not until then, there is hope of the R.A.F. being equipped with machines that have kept step with the development of which the Display bears such concrete evidence.

Concerning the various items there is little need for us to speak here, as these have been fully dealt with in our report of the Display, and in a further article giving some impressions. There are, however, one or two outstanding events and performances to which we think special attention should be called. The evolutions by 36 machines, composed of four squadrons, were a sheer joy to behold, and gave an indication of what a well-equipped and well-trained Air Force will be able to do in years to come. The squadron drill by nine machines, in which wireless was used for the first time for the giving of orders, was an example of the way in which the very latest inventions and ideas are appreciated and utilised by the R.A.F., and, although from the point of view of the general public, owing to some wireless “ruffian’s” interference, this demonstration was not, perhaps, an unqualified success, it is not difficult to realise the enormous effect which the use of wireless for various purposes will have on altering the tactics of air manoeuvres of various kinds.

The bombing of the tank was an excellent example of the way in which very real progress is being made from year to year. On previous occasions it has been the custom for machines to approach their objective more or less in single file, and from the same direction. This year, however, an entirely different method of attack was demonstrated, in which the machines approached apparently from all directions and in such rapid succession that the crew of the tank would have a very scant opportunity of retaliating upon any of the aeroplanes. The judgment shown by the pilots in this event was nothing short of marvellous, the machines crossing one another’s bows at incredibly short distances. It is wellnigh impossible to give an idea of this event pictorially, and photographs entirely fail to show what was really taking place, but a drawing by Charles Dickson, which we publish on another page of this week’s issue, gives probably as

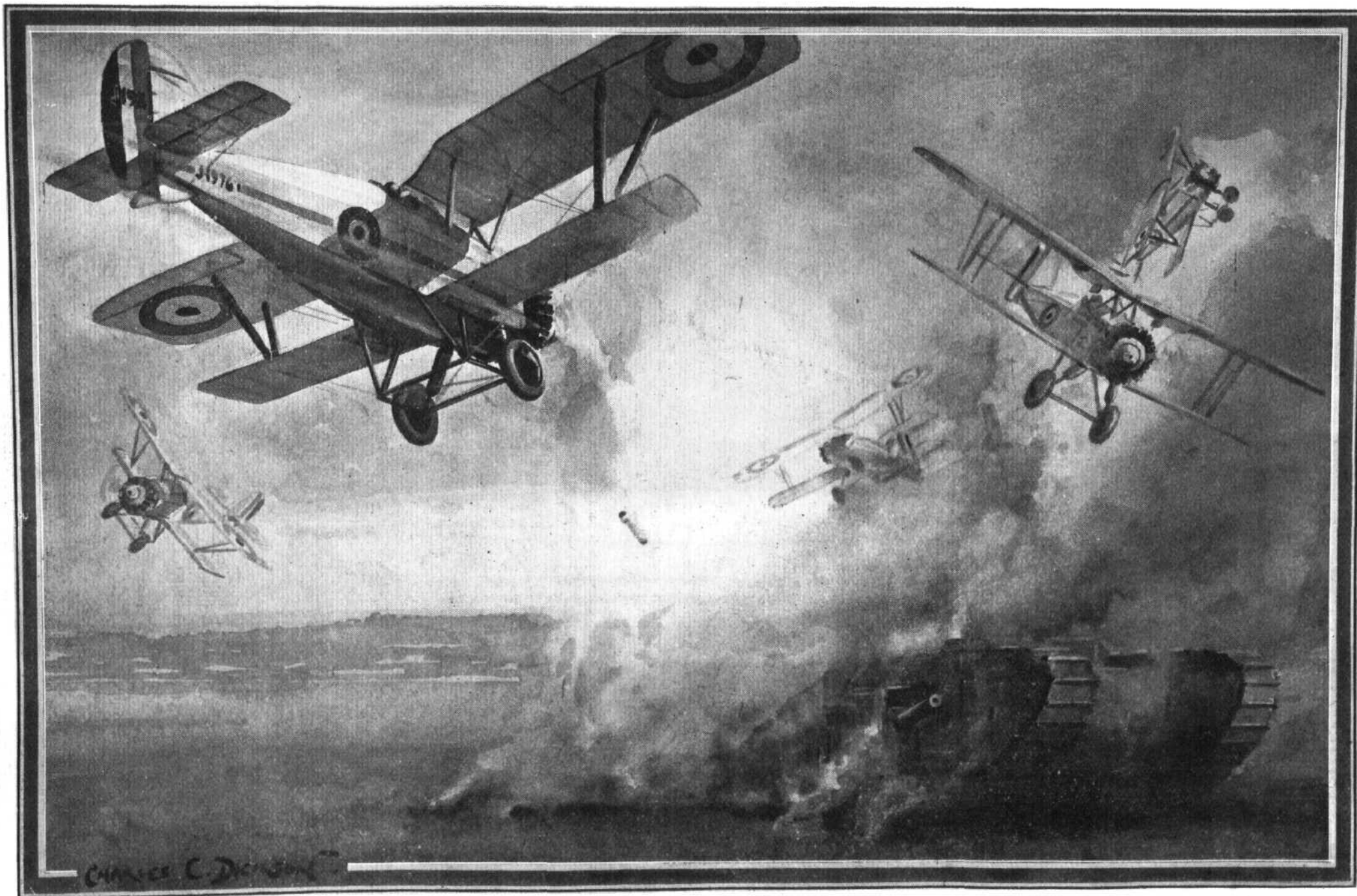
good an idea as it is possible to convey pictorially. This drawing in no way exaggerates the apparent “confusion,” which was in reality the very essence of orderliness, but the attacks happened in such rapid succession as to give to the uninitiated an idea of utter confusion.

The race for D.H.53 light ‘planes was a very welcome innovation and afforded an opportunity for Directorates of the Air Ministry to take an active part in the Display, while at the same time introducing the light ‘plane element, and it is to be hoped that in the future the Air Ministry will encourage the use of light ‘planes in the service for a variety of purposes for which the type seems to be suitable.

Of individual performances of machines it is extremely difficult to single out any particular one, but we do not think we are doing anyone an injustice if we refer briefly to the new Hawker “Heron.” This machine came out a little before the “Fly Past,” and after flying slowly past the enclosures it did a climb, piloted by Flight-Lieut. Bulman, the like of which has, we venture to say, never been seen at a public demonstration before. It is one of the great claims advanced by the helicopter that this type of machine is built to ascend vertically. On Saturday at Hendon the Hawker “Heron” came as near to ascending vertically as no matter, and it was evidently not a question of a short “zoom,” since the machine appeared to keep up this climb indefinitely, until all but lost in the clouds.

With reference to the organisation of last week’s Display, this was as nearly perfect as one has been accustomed to finding it in previous years, and the transport question to and from the aerodrome had been vastly improved by the completion of the Tube extension to Colindale Avenue. We do not claim that it is possible to get some 100,000 people away from the aerodrome in half an hour, but we do maintain that, considering the enormous number of visitors to the aerodrome, the congestion was far less severe than might have been expected.

In conclusion we have a small complaint to make. This is not one which affects the organisation or quality of the Display: it is with reference to the question of photographic facilities. We realise that it would be quite impossible for the Air Ministry to allow carte blanche to press photographers upon the aerodrome itself, but there is no gainsaying the fact that last Saturday’s arrangements for press photographers were bad. Confined in an enclosure which he dare not leave for fear of losing his place in front, there is small opportunity for a photographer to get really good pictures, and the fact that many of the events take place almost at the far end of the aerodrome makes it almost impossible to secure photographs which will worthily represent the splendid events which they are intended to illustrate. We realise that there are difficulties in the way, but we do think that in the future some other scheme should be evolved, either by setting aside a special enclosure in front of the public enclosures, or by building some kind of raised platform from which press photographers can get their pictures without having to “shoot” over one another’s shoulders. After all, “it pays to advertise,” and press photographers play no unimportant part in helping to make gatherings of this nature a success, and it can hardly be thought that the organisers have any desire to handicap this side of the Display.



"AFTER YOU WITH THAT TANK!" One of the most thrilling events seen at this year's R.A.F. Display at Hendon was the demonstration of Low Bombing by three Gloucestershire "Grebes" from No. 25 Fighter Squadron, and three Siddeley "Siskins" from No. 41 Fighter Squadron. Instead of the machines diving on to their target—a stranded Tank—one after another from the same direction, they maintained a continuous attack, swooping down in rapid succession from all directions, with, apparently, only a matter of yards separating each machine, and releasing their bombs from about 50 ft. without the use of bombsights or such-like gadgets. The picture above, by Charles Dickson, gives one an excellent impression of this wonderful "criss-crossing" manoeuvre by the machines.

THE MOREHOUSE LIGHT 'PLANE ENGINE

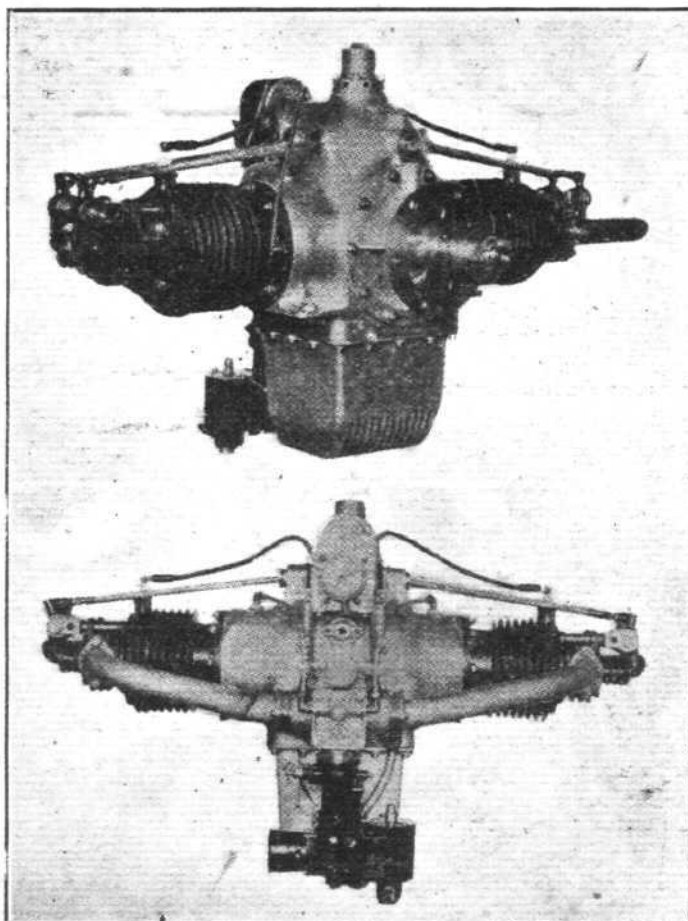
A Horizontally-Opposed Twin of American Origin

IN our issue of "FLIGHT" for March 20, 1924, we published a description of an American light 'plane engine designed by Mr. Harold E. Morehouse, and this week we are able, through the courtesy of our American contemporary, *Aviation*, to give some particulars and illustrations of another light 'plane engine designed by Mr. Morehouse, who is associated with the Engine Design Branch of McCook Field. It should be pointed out that this engine, although of similar type to the previous engine referred to above, is really an entirely distinct model, differing both in detail design and dimensions.

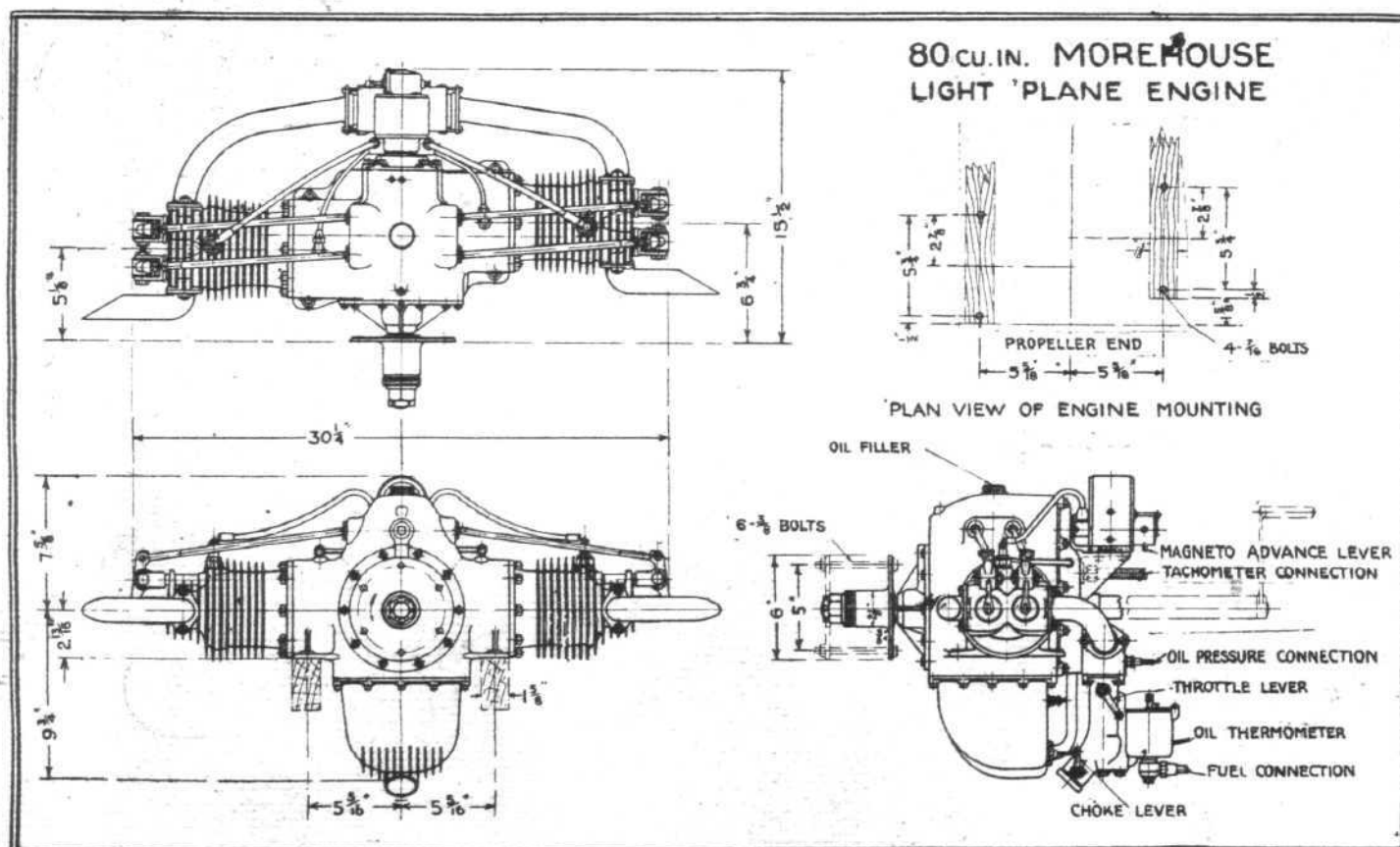
This engine, which is known as model M. 80, has been designed and built to conform to the N.A.A. test requirements for light 'plane engines. In the design of this engine particular attention has been paid to simplicity, ruggedness and the ease of inspection and care. The cost has been kept as low as possible consistent with the necessary requirements for such an engine, and while it is admitted that an engine of lighter weight and higher output could be produced within the same cubic capacity, it has been the aim of the designer to produce an engine in which there are no new or untried features, and one that would give a conservative output with a maximum possible degree of dependability.

The first engine was submitted to McCook Field for collaboration tests and the results are shown in the curve on p. 401. The general arrangement of the engine is clearly shown in the accompanying illustrations and line drawings. The engine has been so designed that a propeller reduction gear may be added if so desired. The first experimental gear is now being built by Thomas L. Fawick, of Racine, Wis., who is engaged in reduction and transmission gear manufacture. This gear would add about 14 lbs. of the weight of the engine and would give a reduction ratio of 2.74 to 1. The Morehouse 80 cubic engine is of two-cylinder opposed four cycle air-cooled type having a bore of 3.75 ins. and a stroke of 3.62 ins. The compression ratio is five to one. It is rated at 28 h.p. at 2,500 normal r.p.m. The weight complete is 85 lbs.

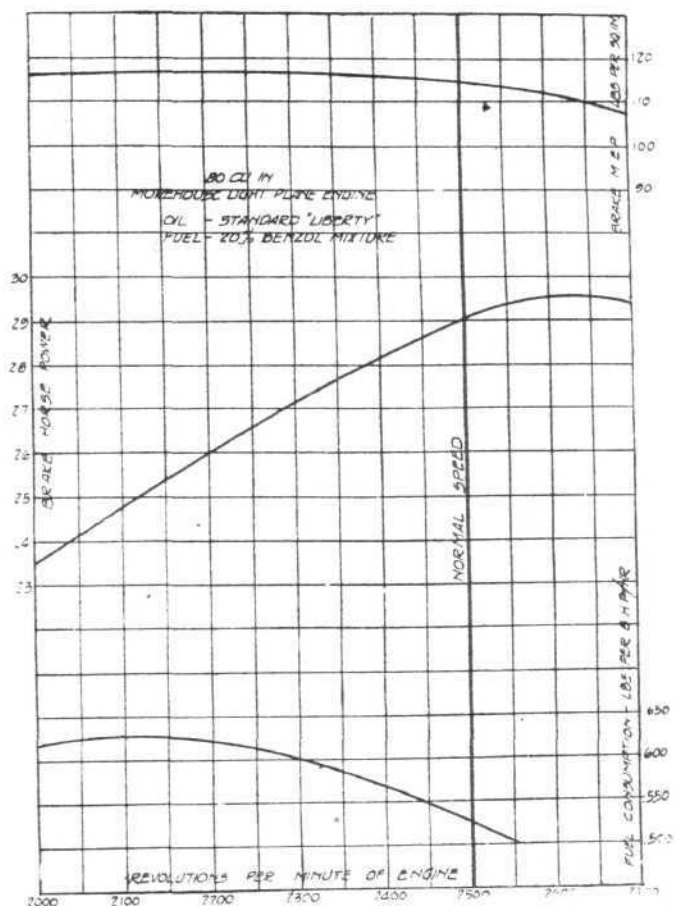
Following motor car practice, amply large plain bearings are used throughout the engine, together with a full pressure oiling system to all bearings, means being provided to regu-



Three-quarter front and rear views of the Morehouse 80 cu. in. Light 'Plane Engine.



THE MOREHOUSE 80 cu. in. LIGHT 'PLANE ENGINE: General arrangement drawings, showing principal overall dimensions.



Power and fuel consumption curves of the Morehouse 80 cu. in. Light Plane Engine.

late the oil pressure by adjustment. The crankcase is a one-piece aluminium casting having a large opening at the front through which the crankshaft is assembled. The cylinders are attached to the crankcase with holding down flanges about half way up the barrel, their location being made in the crankcase by two pilots, one at the flange and the other at the end of the barrel. Closed compartments are thus formed when the cylinders are in place in the crankcase into which the by-pass oil from the pressure regulating valve is equally distributed. This oil, after serving to cool the lower end of the cylinder, is returned to the sump by separate passages. The camshaft, which is parallel to and above the crankshaft, is assembled in the crankcase from the rear. The counterbalanced crankshaft has two throws at 180° and is made of S.A.E. 3,240 steel. Narrow crank pins of large diameter are employed to keep the offset between the cylinders at a minimum.

Forged duralumin connecting rods have shrunk-in bronze

piston pin bushings and removable babbitted steel shells at the lower end. The flat-headed aluminium pistons are 3.125 ins. long and have 0.125 in. wide "Teetor" rings, three at the piston pin and one as a scraper at the bottom. The piston pins have bronze end blocks and are free to float in both the rod and the piston.

The cylinders are of cast iron, having integral cooling fins. There are two tulip-shaped "Rich" cobalt chrome valves per cylinder seating directly in the head, having 45 degrees seats 0.125 ins. wide. The ports measure 1.375 ins. in the clear and the valve lift is 0.375 ins. The cylinders are provided with removable valve guide bushings to permit of replacement. The valves are operated by push rods and rocker arms, the rockers being provided at the push rod end with means for adjusting tappet clearances, and a roller at the valve end. The push rods are sufficiently recessed in their sockets that they cannot come out during flight. The rockers are supported by individual brackets attached to the cylinder by a single stud.

Three spur gears comprise the timing gear train, the crankshaft gear driving an idler directly above at one-half engine speed which serves as the tachometer drive. The camshaft gear is driven from the idler at one-to-one ratio, and the ignition drive is taken from the rear of the crankshaft. A gear type oil pump is incorporated in the aluminium cover, and is driven by a gear at one-half engine speed from the crankshaft. All accessories are conveniently located near the rear on the cover which encloses the timing gears and can be removed as an assembly. The camshaft, which is made of S.A.E. 6120 steel, has its gear and two cams integral, the cams, having a base circle of 1.062 ins. diameter and 0.5-in. face width, operate flat ended followers directly in the crankcase. The valve timing is as follows: inlet opens 10° before top centre and closes 50° past bottom centre; exhaust opens 58° before bottom centre and closes 14° past top centre.

As in motor-car practice the aluminium oil sump is attached to the crankcase from below and is easily removable for the inspection of all interior parts. The oil is cooled by adequately finning the bottom of the sump and again by pumping it completely around the intake passage for a short distance either way at the centre of the engine. About three quarts of oil is carried directly in the oil sump and an oil level indicator is also provided together with filtering arrangement and provision is made for an oil thermometer. To this casting is attached a special aluminium Stromberg 1.25-in. carburettor. Separate tubular manifolds carry the mixture to the cylinders.

The ignition is provided by a Scintilla magneto serving a single spark plug in each cylinder. A combination breather and oil filler is mounted on the top of the crankcase, the breather being provided with a flange to which a tube may be attached leading out of the cowling to carry away any oil vapours.

Provision has been made for attaching a starting crank at the rear of the engine if desired. Two surfaces of ample area are provided along the sides of the crankcase for mounting, using $\frac{7}{16}$ -in. bolts. We understand that several of these engines are being constructed.

French Amphibian Flies from the Seine to the Thames

ON Tuesday morning an experimental flight from the Seine to the Thames was carried out by the Air Union. The machine employed was a boat amphibian of Schreck design, type 19 H.M.T.3, with 300 h.p. Hispano engine mounted as a tractor. This type is a slight improvement on that which in August last year established a world's record by lifting 500 kilograms of useful load to height of 4,755 metres. It is a small machine with a span of 4 m. 40, a length of 9 m. 45 and a height of 3 m. 80 capable of a high speed of 173 kms. and a cruising speed of 160 kms. For this flight an extra petrol tank was fitted. The machine was piloted by M. Bajac, chief pilot of the Air Union, and carried as passengers M. Bardel of the Air Union technical department and Mr. Henry of the *Morning Post*. The two passengers sat side by side behind the wings and appeared to be somewhat cramped.

Starting from the Schreck seaplane works at Argenteuil in the morning, the amphibian landed at Le Bourget, and took off from there at 5.50 a.m. Crossing the Channel at about 800 metres in very fine weather, another landing was made at Lympne for about 15 minutes and then the amphibian made straight for Hammersmith and alighted on the Thames opposite to the wharf of the Anglo-American

Oil Co., Ltd., at 9.15. a.m. She ran about 250 yards on the water and then came smartly to moorings. About half an hour later she proceeded to Croydon, Major Brackley of Imperial Airways this time sharing the back seat with M. Bardel. It took a run of some 500 yards to get off and the machine showed a tendency to porpoise, which the pilot promptly corrected.

The Air Union officials declare that they know nothing of any intention to establish a regular amphibian service between Paris and London. Their eyes are turned rather to seaplane services from the south of France to Cairo and other places in northern Africa, and there is talk of building large three-engined Schrecks for such a service. The flight was purely an experiment for accumulating data about amphibians.

Kenya-Khartoum Air Survey

It is reported that the Uganda Government is contributing £2,000 towards the cost of the Kisumu-Khartoum air survey, thus following the lead of Kenya. Captain Gladstone, representative of the Blackburn Aeroplane Company, is conferring with the Sudan authorities in London on the subject, and at the end of June will go to Brussels to enlist Belgian interest in the scheme.

AERONAUTICAL RESEARCH COMMITTEE REPORTS

FROM the number of enquiries we receive it appears that there is a desire in aircraft circles to know approximately the contents of the various technical publications of the Aeronautical Research Committee. All the aircraft firms probably receive these reports regularly, whether or not they contain anything of immediate interest or utility. In the case of draughtsmen, however, and others interested in aeronautics, who can hardly be expected to purchase all the reports, the problem of deciding whether any publication interests him is often a difficult one. As it is obviously desirable that the knowledge of aeronautics should be made available to all who take an interest in the subject, we have arranged with the Air Ministry to publish in *FLIGHT* summaries of all the technical publications as soon as these are issued, or shortly before they are published. All A.R.C. publications can be purchased from H.M. Stationery Offices at Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 120, George Street, Edinburgh, and through any bookseller.

Test of Three Aerofoils suitable for High Speed, A.D.1 Sloane and R.A.F.26. By F. B. Bradfield and A. S. Hartshorn, B.Sc., of the Royal Aircraft Establishment. Presented by the Director of Scientific Research. Reports and Memoranda, No. 943. (Ae. 163.) October, 1924.

A certain number of new wing sections have been designed at the Royal Aircraft Establishment, and R.A.F.26 is one of this series (see R. and M. 946). As its characteristics were known to be similar to the other well-known sections (A.D.1 and Sloane), a report has been written giving the results of the lift, drag and centre of pressure of each as tested on a model in the No. 1 7-ft. wind tunnel at the R.A.E., at speeds of 60 and 90 ft./sec. The monoplane models were 6 ins. by 36 ins. and 8 ins. by 40 ins.

The results for the three sections, all designed for fast aeroplanes, show but small differences when plotted as curves on the usual bases.

Further Experiments on Honeycomb Radiators. By R. G. Harris, M.A., D.Sc., and L. E. Caygill, B.Sc. Presented by the Director of Scientific Research. Reports and Memoranda, No. 952. (Ae. 171.) November, 1924.

Experiments performed on round tubes in 1922 suggested the usefulness of longer tubes for high speed conditions, and the general principles deduced therefrom suggested that hexagonal tubes should be better under all conditions. Further information was, however, required on the subjects of yaw and shuttering.

The properties of 10 mm. diameter round tubes were investigated over a length/diameter range from 30 to 42, and of 7 mm. diameter tubes for a length/diameter ratio of 36. The hexagonal tube range was from 12 to 36, for 10 mm. diameter only. Drag was measured at 40 and 60 m.p.h., and heat dissipation at speeds varying from 40 to 90 m.p.h.

Drag and heat dissipation have been observed for a selection from these and smaller (1922) radiators under the following conditions:—

(1) Shutter angles from 0° to 90°.

(2) Yaw up to 60° (heat) and 20° (drag).

(3) With spiral springs in the entrances of tubes, in continuation of Prof. Gibson's earlier work.

Longer tubes were found to be better under high speed conditions and with shutters. Larger diameters are better under all conditions, but practical objections (e.g., manufacture and vulnerability) limit their use. Hexagonal tubes are also preferable under all conditions. Shuttering, yawing and using spiral springs were found to be nearly always a disadvantage, as drag is most frequently the dominating factor in determining efficiency.

The results, expressed per unit frontal area, suggested that:—

(1) Heat dissipation at a given wind speed is approximately a function of cooling surface only, and

(2) Drag is a function of both cooling surface and dead area, and larger dead area producing the larger drag. For the present report "dead area" is defined as that part of the frontal area which is occupied by waterways.

The experimental data obtained in the above experiments could be extended and improved by investigating the properties of wing radiators and the drag of hot radiators. Theoretical considerations also suggest the need for measuring the air flow through the tubes.

The Theory of the Design of Aerofoils, with an Analysis of the Experimental Results for the Aerofoils R.A.F. 25, 26, 30 to 33. By H. Glauert, M.A. Presented by the Director of Scientific Research. Reports and Memoranda, No. 946. (Ae. 166.) November, 1924.

It has been a handicap in the past that there is no systematic theory for predicting the performance of a wing section when designed. The present paper gives, in outline, a theory based

upon Prandtl's work at Göttingen, and the results predicted therefrom give good agreement with model tests on a number of sections, R.A.F. 25 to 33, designed by this theory. The experimental results for the aerofoils in question are given in R. and M., Nos. 915, 928 and 943, and they should be compared with the theoretical results of the present paper.

The essential feature of the present theory is to curve the centre line of a good symmetrical section into a circular arc of suitable camber. In the case of high camber, a cubic curve was also tried for the centre line in order to reduce the movement of the centre of pressure. The experimental results have been analysed for comparison with the theoretical predictions, and curves are drawn showing the relative merits of the aerofoils.

Other papers dealing with the theory of aerofoils are the following:—

(i) A Method of Calculating the Characteristics of a Tapered Wing.—H. Glauert R. and M. 824

(ii) A Theory of Thin Aerofoils.—H. Glauert... R. and M. 910

(iii) A Generalised Type of Joukowski Aerofoil.—H. Glauert... R. and M. 911

It is considered that the theoretical basis of the method of design described in the present paper (R. and M. 946) has been fully confirmed by the experimental results. Further progress may be obtained by seeking for the best possible symmetrical sections of suitable thickness, and further experimental investigation is also required on the effect of reflex curvature in thin and in thick aerofoils.

An Experimental Investigation into the Properties of Certain Framed Structures having Redundant Bracing Members. By Prof. A. J. Sutton Pippard, M.B.E., D.Sc., and J. F. Baker, B.A. Reports and Memoranda, No. 948. (Ae. 168.) December, 1924.

Following on the accident to R.38, the Accidents Investigation Sub-Committee of the Aeronautical Research Committee carried out a lengthy investigation as to its cause, which was duly reported in R. and M. 775. One of their recommendations was that a special panel should be set up to fix methods of calculating the stresses in braced frameworks such as are used in the construction of rigid airships. The report of this Airship Stressing Panel was published as R. and M. 800.

Amongst the points raised by the work of the panel was the application and experimental limitations of the method of minimum strain energy, and attention has been drawn to this point in a paper by Mr. Southwell entitled "On Castigliano's Theorem of Least Work and the Principle of St. Venant," *Phil. Mag.*, vol. xiv, January, 1923. The present experiments relate to a braced hexagonal tube, which is the most complicated case for which a complete theoretical solution has up to the present been obtained.

The first set of experiments were on the tube when subjected to bending and shear, and the second similarly for torsion. The model was so designed that for practical purposes all the joints could be considered as pin-jointed, and in all cases where the bulkheads could be considered as remaining plane the theoretical conclusions of R. and M. 800 were well substantiated by experiment.

The torsion experiments were carried out to determine the degree of accuracy obtainable in an actual structure, and to discover the effect of varying the elasticity of the bulkhead bracing in the transverse to which the torque was applied when the external loading, although giving a resultant pure torque, was not applied to the joints as hypothecated in the analysis. When the end bulkhead was radially braced with rods the experimental results agreed well with theory, but when there was no bulkhead bracing considerable distortion resulted. It was, however, concluded that with reasonably efficient bulkhead bracing in the transverse frame to which the torque is applied, the actual loads would be very close to the theoretical values obtained upon the assumption that the torque was applied in a particular manner.

FLIGHT

ROYAL AIR FORCE DISPLAY HENDON JUNE 27



The R.A.F. DISPLAY

If the Royal Air Force Display—until this year styled the Royal Air Force "Pageant"—continues its increase in popularity and its extraordinary advance in the quality of the programme as it has been doing year by year, there is little reason to doubt that before long this annual event will have to be held, not for one day only, but over a period of several days. After all, this obtains in the case of the Royal Tournament at Olympia, and the R.A.F. Display forms, to all intents and purposes, the aerial side of the Tournament which, of course, cannot be held in Olympia. Anyway, on Saturday, when the Royal Air Force held its Sixth Display—"Display" is certainly *much* better than "Pageant"—

at Hendon Aerodrome, the total number of spectators in the various enclosures was unquestionably a record one, as compared with the previous displays, being at least 100,000, if not more. On previous occasions the few odd thousands who watched the events from neighbouring fields, outside the aerodrome, also contributed towards the R.A.F. Memorial Fund—in aid of which the proceeds of the display go—and we assume the same held good this year. We hope so, at all events, for the "outsiders" were as strong as ever.

One outstanding point in connection with this year's Display was undoubtedly the fact that the new "Tube" station at Colindale—just a matter of three or four minutes

Aerial Pageant 1925 H4



Aerial Pageant 1925 H3
THE R.A.F. DISPLAY AT HENDON: Top, one of the motor-car parks—cars were very much in evidence this year. Below, view of the Royal box and main enclosures, that in the immediate foreground being the one reserved for Members of Parliament. The other loud speakers (wireless type) were located just behind the Royal box.

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THE ROYAL VISITORS AT THE R.A.F. DISPLAY : Their Majesties the King and Queen entering the Royal Enclosure at Hendon. In the enclosure are also Sir Samuel Hoare, the Duke and Duchess of York, Sir Hugh Trenchard, and Sir Philip Sassoon.

from the aerodrome—enabled many thousands of visitors to get to and from the Display with the minimum of discomfort (under the circumstances) and in a much shorter space of time than hitherto. Personally, we missed with pleasure that tedious tramp, *a la sardine*, of an hour or more up the hill to Hendon Church *en route* for Golder's Green, "after the show was over." Apart from the "Tube," however, which must have brought many more people to Hendon this time, it appeared to us that the number of cars that turned up this year was considerably greater than on previous occasions.

Saturday's visitors to the 'drome started arriving at an

early hour, and by 1 p.m. the main enclosures, round about the Royal Box, presented a brilliant, animated, and "full-up" appearance. In addition to members of the Royal Family, who arrived later on, there was a most distinguished gathering present. It would be almost impossible to give the names of all those present, besides Brown, Jones and Robinson, but there were present, in addition to most of the heads of the Air Force, representatives of the Army and Navy, members of the Cabinet, of both Houses of Parliament, representatives of the Dominions, foreign ambassadors and naval, military and air attachés, etc. To mention but a few of these, there were



ROYALTY AT THE R.A.F. DISPLAY : The Royal party walking past the enclosures on their way to visit the machine park. With their Majesties will be seen (from left to right) Sir Philip Sassoon, the Duke and Duchess of York, Sir Hugh Trenchard, Flt.-Lieut. the Hon. J. H. B. Rodney, M.C., Sir Samuel Hoare, and Sir Geoffrey Salmond.

FLIGHT

Arrival Pageant 1925 A1



AT THE R.A.F. DISPLAY : Event No. 1, the Landing Competition for a cup presented by the Duke of York. Above, six of the Avros from the various training schools lined up for the start. Inset No. 1, Flying Training School Avro landing in the "field."

present Air Chief Marshal Sir Hugh Trenchard and Lady Trenchard, Air Marshal Sir John Salmond and Lady Salmond, Air Vice-Marshal Sir Geoffrey Salmond and Lady Salmond, Air Vice-Marshal Sir Philip Game, Air Vice-Marshal J. M. Steel, Air Commodore C. A. H. Longcroft, Air Commodore T. C. R. Higgins, Air Vice-Marshal H. R. M. Brooke-Popham, Air Vice-Marshal F. R. Scarlett, Air Commodore C. R. Samson, Air Commodore C. L. N. Newall, Sir Samuel and Lady Hoare, Maj. Sir Philip Sassoon, the Duke and Duchess of Sutherland, Capt. F. E. Guest, Brig.-Gen. Lord Thomson, Lord Salisbury, Admiral of the Fleet Lord Beatty, Lord Weir, Sir William Joynson-Hicks, Lord Balfour, Lord Hugh Cecil, Lord and Lady Allenby, Sir Henry and Lady White Smith, Lord Haldane, Lord Jellicoe, Sydney Smith, Esq. (R.A.E.), H. T. Tizard, Esq., F. H. Royce, Esq., etc. There was a very "full house" in the enclosure adjoining the Royal "Box," which was reserved for members of Parliament.

As regards the weather, during the greater part of the day the sky was overcast with heavy and, at times, threatening clouds, but now and again we were given a burst of warm sunshine, which was very welcome for the gusty northerly wind rendered sitting out in the open a somewhat cold business. The conditions were, however, ideal for watching the flying, owing to the absence of glare, but from the flying point of view, the wind was a little worrying, especially for the light planes and the formation flying.

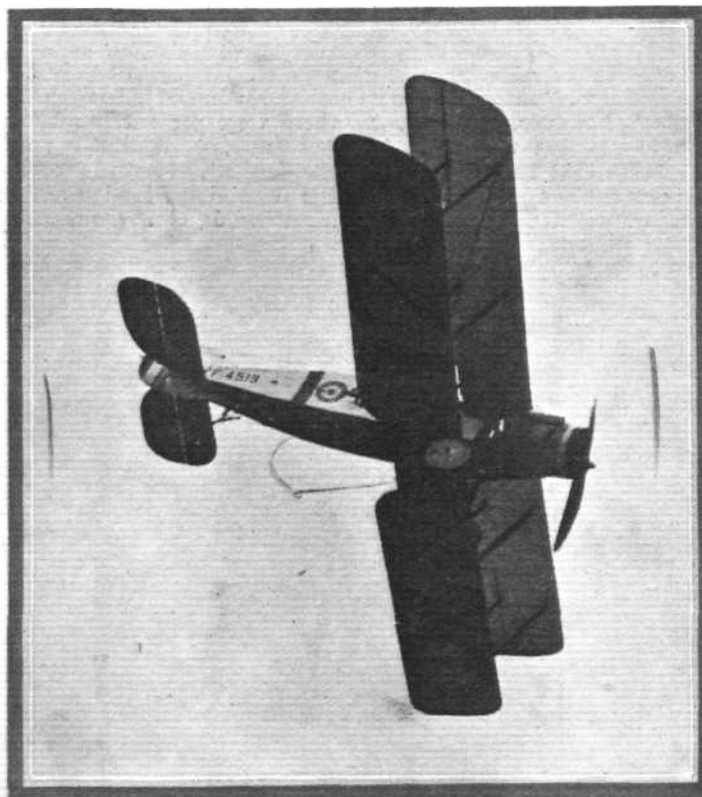
While there was a certain liveliness in the aerodrome during the early part of the day, it was not until about 1.30 p.m. that the first really exciting item occurred, when a machine—we think it was one of the good old Sopwith "Snipes"—went up and executed a number of really excellent stunts, including one of the longest sustained upside-down flights we have seen. This was followed shortly after by another very

pretty display by two Siddeley "Siskins," which, after zooming heavenwards at an extraordinarily steep angle, gambolled together over the aerodrome, executing loops, rolls, spins and other manœuvres quite close together.

Shortly after 2 p.m., Flight-Lieut. W. S. Bulman—a name well known to most of our readers—made a flight on the new Hawker "Heron" (400 h.p. Bristol "Jupiter"), a single-seater fighter of metal construction. From the way in which Bulman took this machine up, it looked as if it would do exceptionally well in the forthcoming Helicopter competition! After putting the "Heron" through various evolutions, Bulman proceeded to climb high, and it was not long before he was just a speck in the sky. Altogether, this latest effort of the Hawker Engineering Co., Ltd., possesses a very creditable performance, and when he came down some time later, its slow and easy landing gave a very favourable impression.

In the meanwhile, a Bristol Fighter and a "Grebe" put up a magnificent aerial combat, the "pap-pap-pap" of their machine-guns causing much enthusiasm amongst the spectators. Then an Avro "Aldershot" bomber and a Vickers "Virginia" bomber, both huge machines, came along and made a test flight, cruising around above the aerodrome for some time. By now the enclosures looked pretty well full, yet visitors were still streaming in. It was a brilliant spectacle indeed, equal in every way to such functions as Ascot—gay and fashionable frocks being very much in evidence. Of course, the Central Band of the Royal Air Force (Uxbridge) was giving us an excellent programme of music.

Just as the first event was about to commence at 3 p.m., a general commotion and outburst of cheering heralded the arrival of their Majesties, the King and Queen. They were received by Air Commodore Webb Bowen, Chairman of the Display Committee, and



AT THE R.A.F. DISPLAY : Event No. 2, the Message Picking-up Competition. The Bristol Fighter from No. 16 (Army Co-operation) Squadron dives to pick up its message, which is suspended in a bag on a line between two posts by means of the line, provided with hooks, seen trailing below the fuselage.

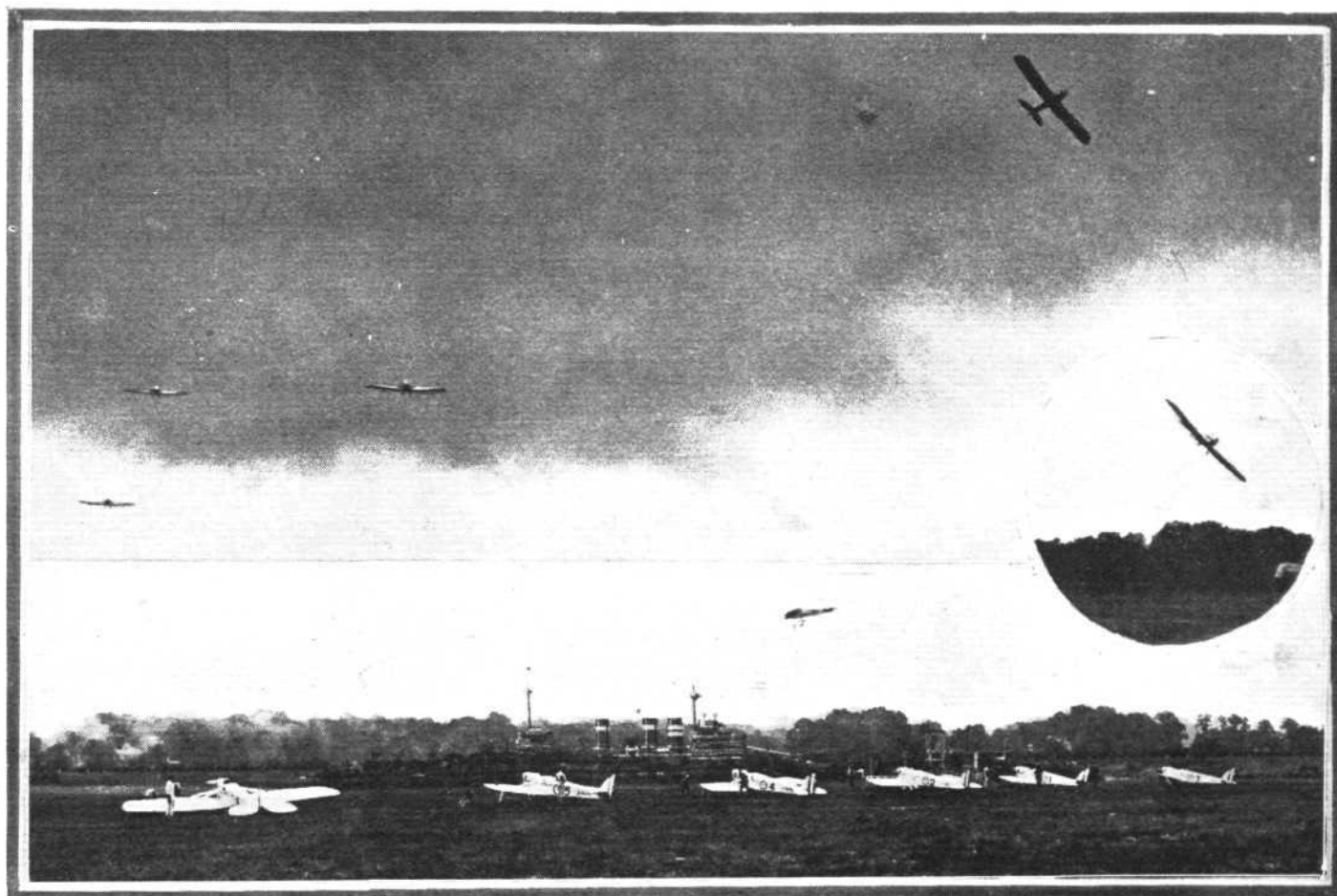
FLIGHT

Air Commodore B. C. H. Drew, who escorted them to the royal enclosure, where they were met by Sir Samuel Hoare, Secretary of State for Air, and Air Chief-Marshal Sir Hugh Trenchard, Chief of the Air Staff. The Duke and Duchess of York had arrived some time previously and were already in the royal box.

The first event was a landing competition for a cup presented by the Duke of York. In this event seven units from various training schools, each flying an Avro 504, took part. The competitors were as follows: I, No. 1 Flying Training School, F/O R. S. Higgins; II, No. 2 Flying Training School, Sgt. L. C. Snaith; III, No. 5 Flying Training School, F/O R. S. Greenslade; IV, Central Flying School, D. D. A. Greig, D.F.C.; V, No. 24 Communication Squadron, F/O R. H. S. Spaight; VI, Cranwell, F/O E. D. Barnes; VII, Halton, F/O W. J. Walsh. The competitors took off together in their Avros and climbed to about 1,000 ft., and then, one at a time in the order given, they switched off their engines and each made an attempt to land his machine in a "field" 150 yards square,

taken by the aeroplanes of each team were added together, and the team with the smallest aggregate time proved the winner. The units taking part in this event were as follows: I, No. 2 Army Co-operation Squadron; II, No. 4 Army Co-operation Squadron; III, No. 13 Army Co-operation Squadron; IV, No. 16 Army Co-operation Squadron; V, School of Army Co-operation. No. 4 Army Co-operation Squadron won this event in fine style. The pilots of the two Bristols in this squadron were F/O R. G. Mullette and F/O R. T. Halliwell, and the observers were F/O A. D. Davies and P/O M. D. Ommanney.

While this event was in progress considerable interest was aroused when six D.H.53 light aeroplanes were wheeled out of the machine park and lined up in front of the enclosure ready for the next event. This third event was a light 'plane race open to Directorates of the Air Ministry, and was flown over one of the cross-country courses of the old Hendon flying meetings. This was out over Mill Hill and back, a distance of about five miles, the competitors flying two laps



Aerial Pageant 1925 A2
THE LIGHTER SIDE OF THE R.A.F. DISPLAY: Event No. 3, the Light Aeroplane Race, open to the Directorates of the Air Ministry, on D.H. 53's. Above, four of the six D.H. 53's entered finishing their first lap (about 5 miles). Below, the line up of the six youngsters before the start. Inset, the winning machine (Wing-Comdr. W. S. Douglas, M.C., D.F.C., "Equipment") finishing.

marked out on the aerodrome by light posts and fabric representing a hedge. As this "field" was some little distance away from the enclosure, it was not very easy to observe from our view-point what actually happened as each competitor landed. This event was won by Sgt. Snaith, No. 2 Flying Training School.

The next event was an interesting and popular one, being a message picking-up competition between a team of two Bristol fighters from the School of Army Co-operation, and each of the four Air Co-operation squadrons. In this event, a message contained in a bag was suspended on a line stretched between two posts. The two Bristol fighters of each team "took off," and then swooped down towards the posts and, by means of a trailing line provided with hooks suspended below the fuselage, snatched up the message. As the machine zoomed upwards the observer drew in the message, wrote the reply, and, the pilot meanwhile having manoeuvred the machine back over the message picking-up station, the reply attached to a streamer was dropped overboard. Each competitor was timed from the moment the message bag was taken up until the answer was handed to the Umpire, and the times

of this course. The six entrants represented the following Directorates: I, Operation and Intelligence (Flight-Lieut. W. C. Dickson); II, Organisation and Staff Duties (Flight-Lieut. M. Thomas); III, Personal Services (Air-Commodore C. H. Longcroft); IV, Training (Flight-Lieut. G. M. Bryer); V, Scientific Research and Technical Development (Wing-Commander H. N. Cave-Brown-Cave); VI, Equipment (Wind-Commander W. S. Douglas).

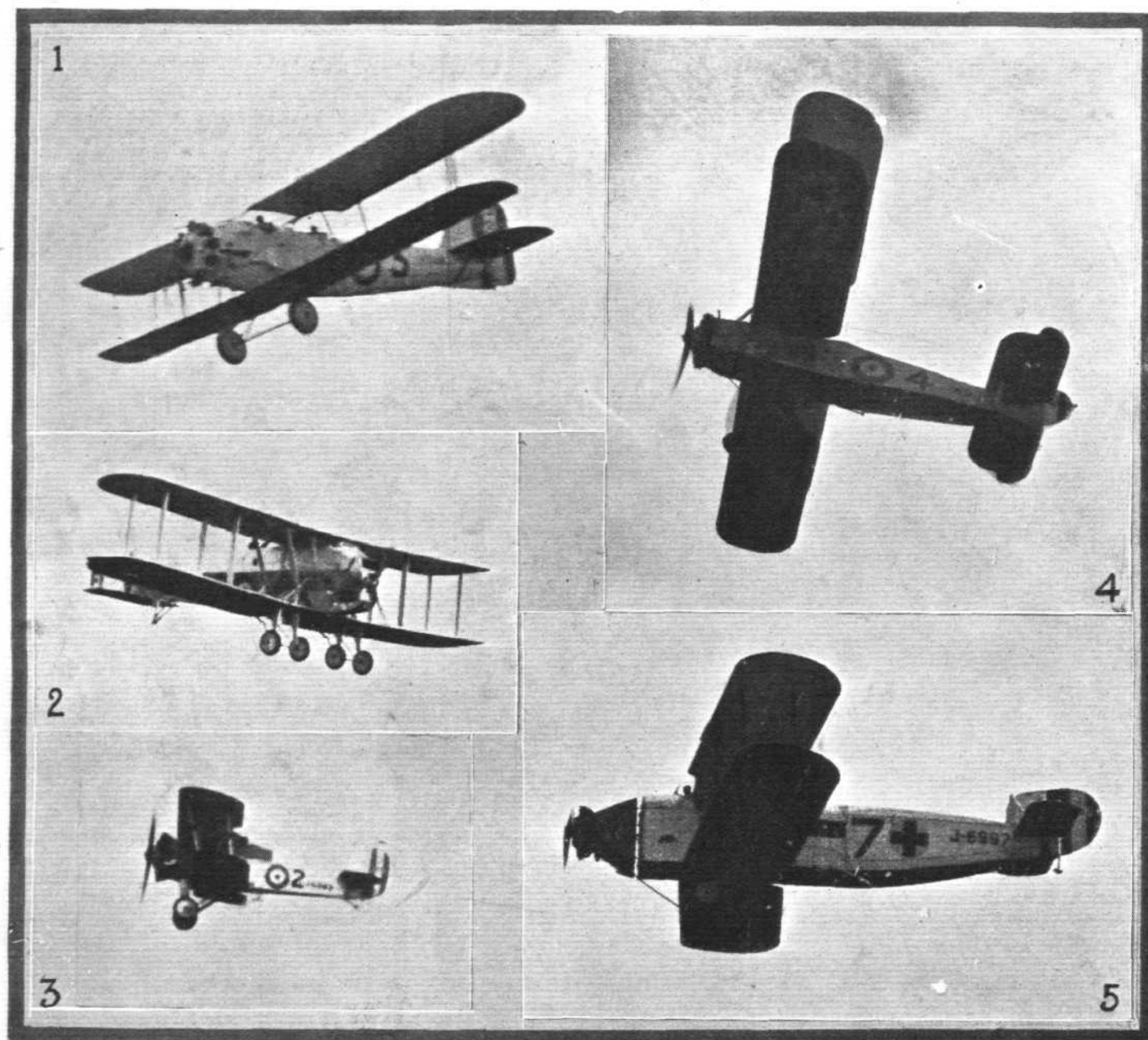
The six D.H.53's all took off together, flying very close to each other, their Blackburne "Tomtit" engines making a noise similar to a crowd of people enthusiastically clapping their hands. It was certainly a most exciting and spectacular take-off. All got away in fine style, and by the time they reached the far end of the aerodrome the various competitors began to sort themselves out. The turning point was in full view of the spectators, and it was a pretty sight indeed to see these little machines banking smartly around the Mill Hill Tower. Coming back into the aerodrome they reached the turning point in the following order: I, VI, II, III, IV, V—the first four being very close together. After banking smartly round they set out on the second lap, during which

some of the machines were observed to change places. At the end of the second lap they finished, crossing the line in front of the royal enclosure, the order of finish being VI, III, I, II, IV, V; thus Wing-Commander Douglas won this event for the Directorate of Equipment.

In the meantime a deafening roar in the machine park drew attention to event No. 4, the Fly Past of new and experimental types of aircraft. One by one the machines emerged from the park, taxied past the royal enclosure, then, taking off, flew round the aerodrome, dipping in salute as they once again passed the royal box. The machines taking part in the fly past were as follows:—

Gloucestershire "Gamecock," single-seater fighter with 400 h.p. Bristol Jupiter. The Hawker "Heron," previously

machine with accommodation for fourteen passengers, which will be used on the London-Continental Air Service by Imperial Airways. It is fitted with a 650 h.p. Rolls-Royce "Condor" (a detailed description of this machine appeared in last week's issue of FLIGHT). The Vickers "Vanguard," another civil transport machine accommodating 22 passengers, which has been adapted from the Vickers' "Troop Carrier" of similar type. It is fitted with two 450 h.p. Napier "Lions." Some considerable excitement was caused during the Fly Past when the huge and fierce looking "Cubaroo" came thundering along past the Royal Enclosure, with tongues of flame belching forth from the engine, and not a few were under the impression that it had caught fire. As a matter of fact it was nothing more serious than



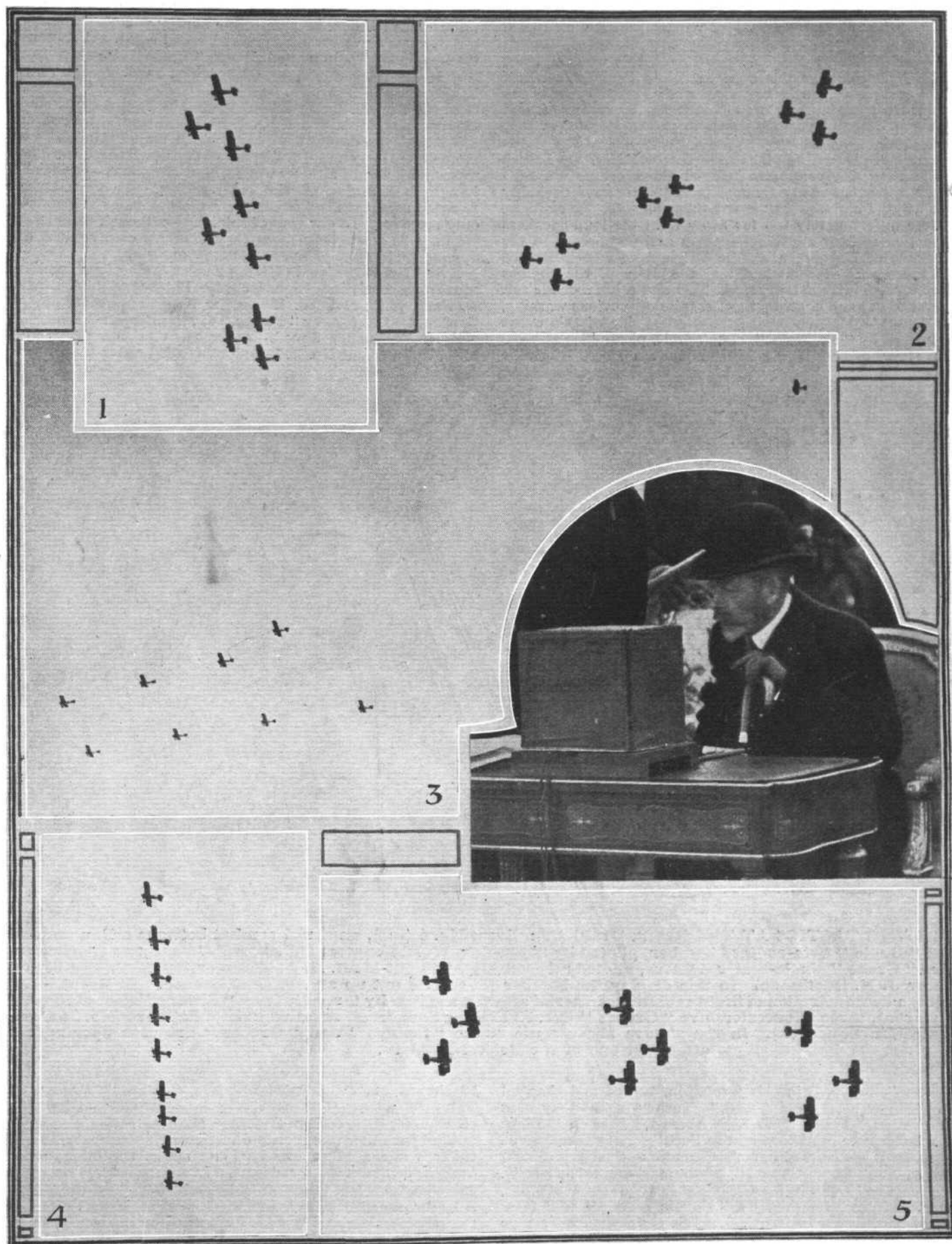
"NEW AND EXPERIMENTAL": Some of the machines which took part in the "Fly Past" at the R.A.F. Display. (1) Short "Springbok" (400 h.p. Bristol "Jupiter"), an all-metal Army Co-operation biplane. (2) Blackburn "Cubaroo" (1,000 h.p. Napier "Cub"), a torpedo-carrier coastal-defence type. (3) Hawker "Heron" (400 h.p. Bristol "Jupiter"), a single-seater fighter mainly of metal construction. (4) Bristol "Brandon" (400 h.p. Bristol "Jupiter"), a three-seater reconnaissance machine. (5) Gloucestershire "Gamecock" (400 h.p. Bristol "Jupiter"), an ambulance plane.

referred to, should have come next in the Fly Past, but for some reason or another did not put in an appearance. The Short "Springbok," an Army Co-operation machine of all metal construction, with a 400 h.p. Bristol Jupiter. The Hawker "Hedgehog," a three-seater reconnaissance machine with 400 h.p. Bristol "Jupiter." The Blackburn "Cubaroo," a huge torpedo carrier, coastal defence biplane, fitted with the famous 1,000 h.p. Napier "Cub." The Bristol "Brandon" Ambulance plane, complete with Red Cross, with 400 h.p. Bristol Jupiter. The D.H.54, a civil transport

the burning of the unexploded mixture passing out through the exhaust when the pilot throttled down. Nevertheless, it certainly looked very alarming.

Shortly after 4 p.m. what was perhaps the principal event of the afternoon took place—Squadron Drill with radio telephony. This was carried out by No. 25 Fighter Squadron, consisting of nine Gloucestershire "Grebes," under the command of Squad.-Ldr. A. H. Peck, D.S.O., M.C. Hitherto the leader of a squadron carrying out air drill has signalled his orders to the other pilots of the formation by means of

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"HALLO, MOSQUITOS! ALTER COURSE 16 POINTS OUTWARDS."—This was the command given by the King to No. 25 Fighter Squadron, under Squadron-Leader A. H. Peck, by means of wireless during the squadron drill at the R.A.F. Display. We show above his Majesty speaking into the microphone, and also some of the formations carried out by the nine "Grebes." (1) "Flight Mass Line Abreast." (2) "Flight Mass Echelon to Port." (3) "Double Line Ahead" (immediately preceding the King's order). (4) "Line Abreast." (5) "Flight Mass Line Ahead."

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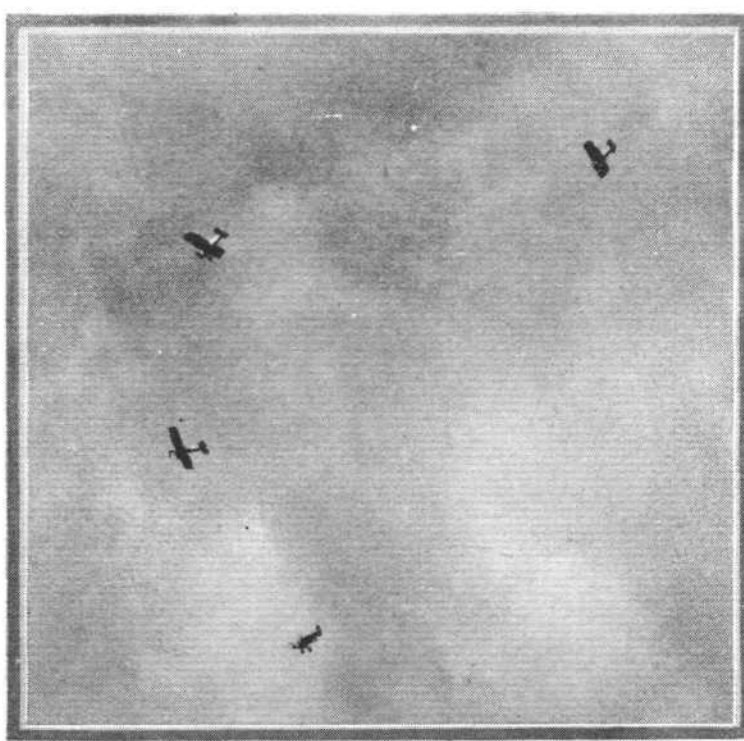
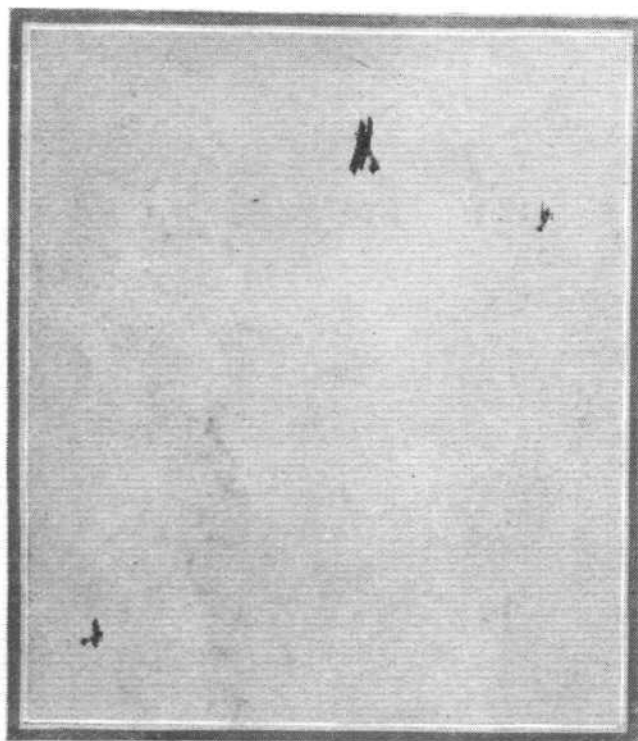
code—either by hand or special movements of the machine. The advent of wireless telephony, however, has altered this, and the leader now speaks his commands, which are heard by the other pilots by means of wireless, with which each machine is equipped. On Saturday the various evolutions were carried out by No. 25 Squadron in this way, and not only did the pilots of the eight machines hear Squad.-Ldr. Peck's commands, but a receiving station on the aerodrome also picked them up and broadcast them, by means of loud speakers located at various points in the enclosures, so that the spectators—or at least some of them—heard the words of command just as the pilots did. Incidentally, the British Broadcasting Company also relayed these orders via 2LO and 5XX so that many thousands of "listeners," probably miles away from Hendon, heard them as well. Personally, we were unfortunately too far away from the loud speakers at Hendon to hear anything—yet on arriving home, on the other side of London, after the Display we were informed that the words of command and the noise of the engines were heard, faintly it is true, via 2LO and a home-made set. It is stated in some quarters that, in spite of previous warning, considerable interference with the wireless side of this event was caused by "amateurs." *Don't do it, please!*

However, after taking off in "Squadron Mass," the nine

was the call sign of the day for the machines in the air—"Alligator" being the ground station's call sign. All the evolutions carried out by the machines were executed with wonderful precision, in spite of the bumpy wind.

After this came Event No. 6, an aerial combat between a twin-engined Boulton and Paul "Bugle" bomber from No. 58 Bombing Squadron, piloted by Squad.-Leader W. H. Longton, D.F.C., A.F.C., and two single-seater "Grebes," from the Central Flying School, piloted by Flight-Lieut. H. A. Hammersley, M.C., and F./O. J. N. Boothman. Apart from the technical side of this event, which we must admit was more or less lost on us, the display put up by all three machines was without doubt a really wonderful performance—especially Longton's handling of the big machine. It seemed that Longton repeated his "crazy" flying of previous Pageants—only more so. To our way of thinking—although technically we may be wrong—he more than held his own against his opponents, in spite of their smart manoeuvring.

Event No. 7 consisted of Wing Evolutions by four bombing squadrons, consisting of Squadrons No. 12, under Squad.-Leader A. Gray, M.C., and No. 100, under Squad.-Leader H. F. A. Gordon, O.B.E. (Fairey "Fawns," 450 h.p. Napier "Lions"); and No. 39, under Squad.-Leader H. V. C. de Crespigny, M.C., D.F.C., and No. 207, under Squad.-Leader V. Gaskell-



FIGHTING TACTICS AT THE R.A.F. DISPLAY: Event No. 6 (left), an aerial combat between a Boulton and Paul "Bugle" twin-engined bomber, piloted by Sqdn.-Ldr. W. H. Longton, D.F.C., A.F.C., and two Gloucestershire "Grebe" single-seater fighters, piloted respectively by Flight-Lieut. H. A. Hammersley, M.C., and Flying Officer J. N. Boothman. In this display the bomber (in centre) put up an excellent defence. In Event No. 9 (right) a demonstration of flight evolutions in aerial attack was given by three Siskin (No. 41 Fighter Squadron), three Gloucestershire "Grebes" (No. 32 Fighter Squadron), and two Bristol Fighters (No. 24 Communication Squadron). In the picture above some of the "Siskins" and "Grebes" are seen opening the attack on one of the Bristol Fighters.

"Grebes" flew past in this formation, turned and changed into "Flight Mass Line Ahead." Turning again they next flew past in "Flight Mass Line Abreast," then in "Flight Mass Echelon to Starboard and to Port." They then formed "Squadron"—the familiar A formation—which was next changed to "Line Abreast" (each machine side-by-side). Then came "Double Line Abreast" (two rows of four, leader in front), followed by "Double Line Ahead" (four rows of two, leader in front). At this point the leader gave the signal "Awaiting His Majesty's Order." The King then spoke into the microphone before him, saying "Hallo, Mosquitoes! Alter course 16 points outwards" (i.e., about turn). Immediately the leader executed a loop and half roll from the top, whilst the others turned sharply in the reverse direction, and there was the formation once again in "Double Line Ahead," but flying in the opposite direction. The King's command, it may be mentioned, was heard very clearly on the loud speakers. "Mosquitoes," by the way,

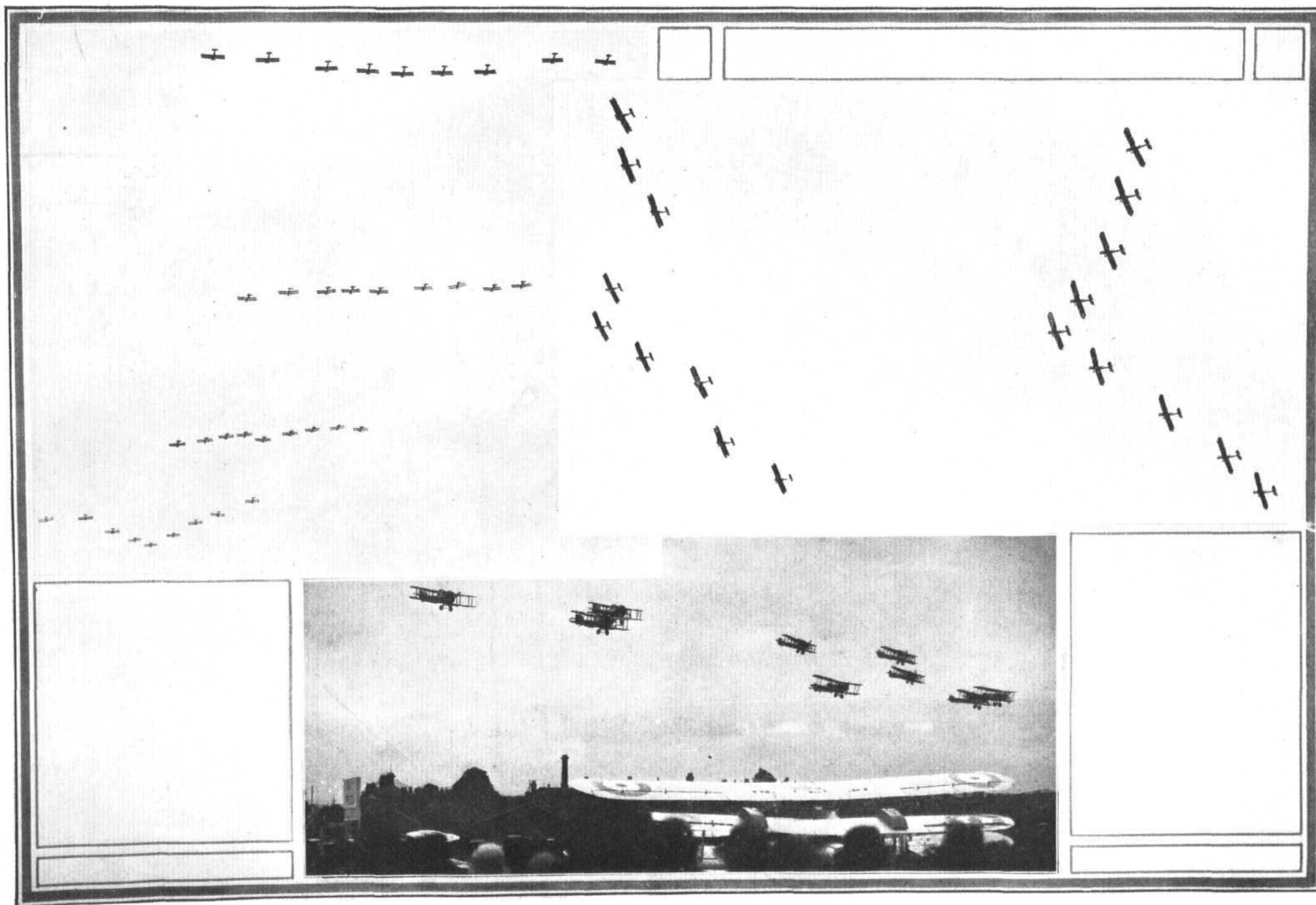
Blackburn, D.S.C., A.F.C. (D.H. 9a's, 400 h.p. "Liberty's"). This made a total of 36 machines; squadrons 39 and 100 took off together first, each in Squadron Mass formation, and when well up each flew in opposite directions, then turned and flew towards one another, passing, one above the other, when over the centre of the aerodrome. In the meanwhile the other two squadrons had taken off and eventually joined the others. All four squadrons then executed a series of evolutions in remarkably close and regular formation, at the conclusion of which they landed, two squadrons at a time, in Squadron Mass.

The next event, a demonstration of low bombing, by the winners and runners up of a competition, was intensely thrilling. The object of this demonstration was to show a method by which a number of single-seater fighters—three "Grebes" from No. 25, and three "Siskins" from No. 41 Fighter Squadron—would attack a ground target (in this case, a stranded tank). Instead of swooping down on their prey in single file from one direction as on previous occasions, the machines

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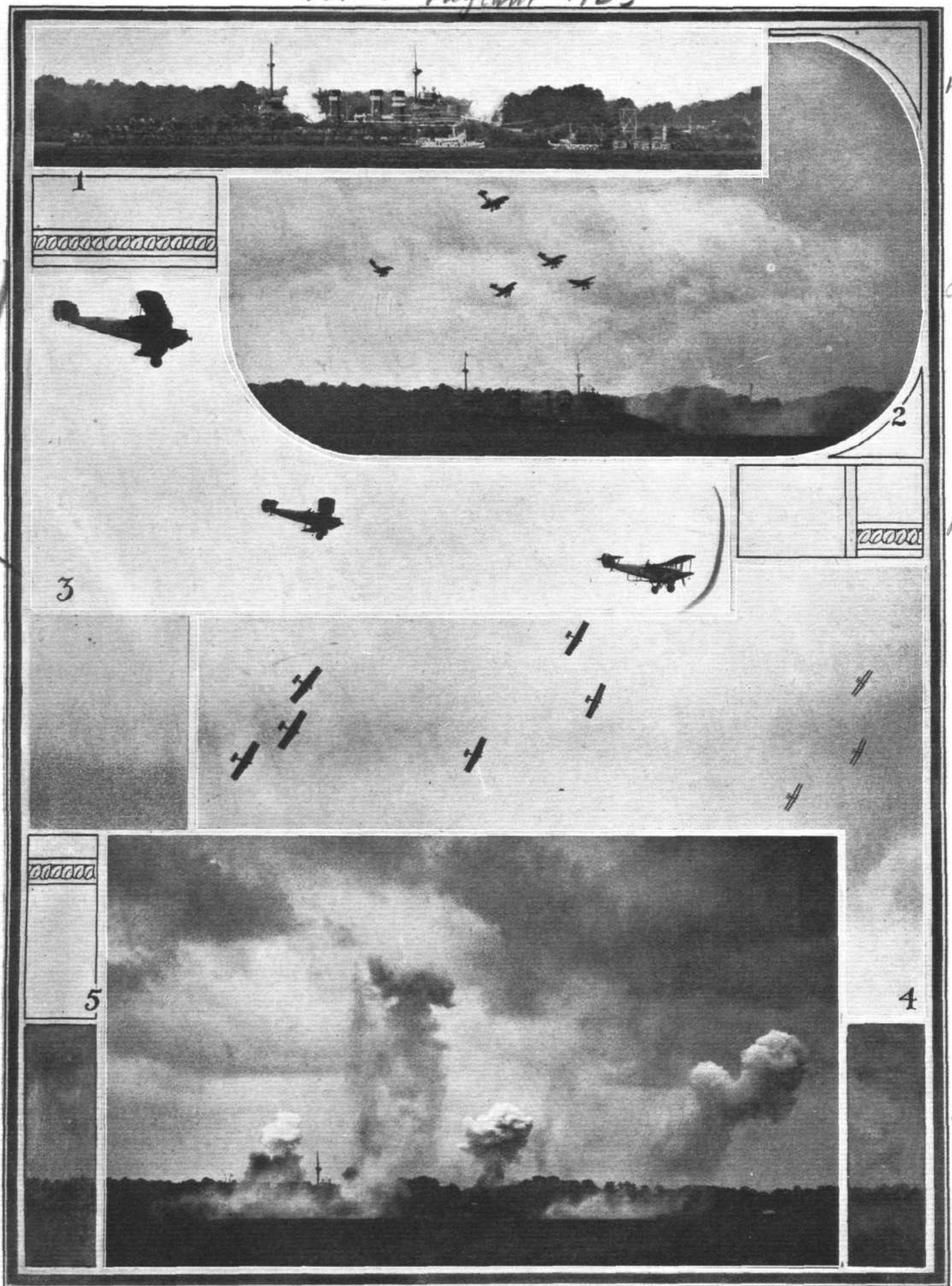
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Wing Evolutions by four Bombing Squadrons (18 Fairey "Fawns," and 18 D.H.9a's). On the left the machines changing from "Wing Line Ahead Squadrons Line Abreast" to "Wing in Line Ahead of Squadrons." On the right two Squadrons changing from "Squadron" to "Squadron Mass."

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Aerial Pageant 1925



THE GRANDE FINALE AT THE R.A.F. DISPLAY : (1) The enemy cruiser, a commerce raider, has taken refuge up a tropical river, but is discovered by a Supermarine "Seagull," (high up out of the picture) which is fired at by the cruiser's anti-aircraft guns, but—(2) Five Fairey "Flycatcher" Fleet Fighters arrive to the support of the "Seagull," and then (3) Three Avro "Aldershot" heavy bombers and—(4) Nine Vickers "Virginia" dittoes arrive from a base thoughtfully provided near by, loaded with a few best-quality pills to (5) Finish up the job!

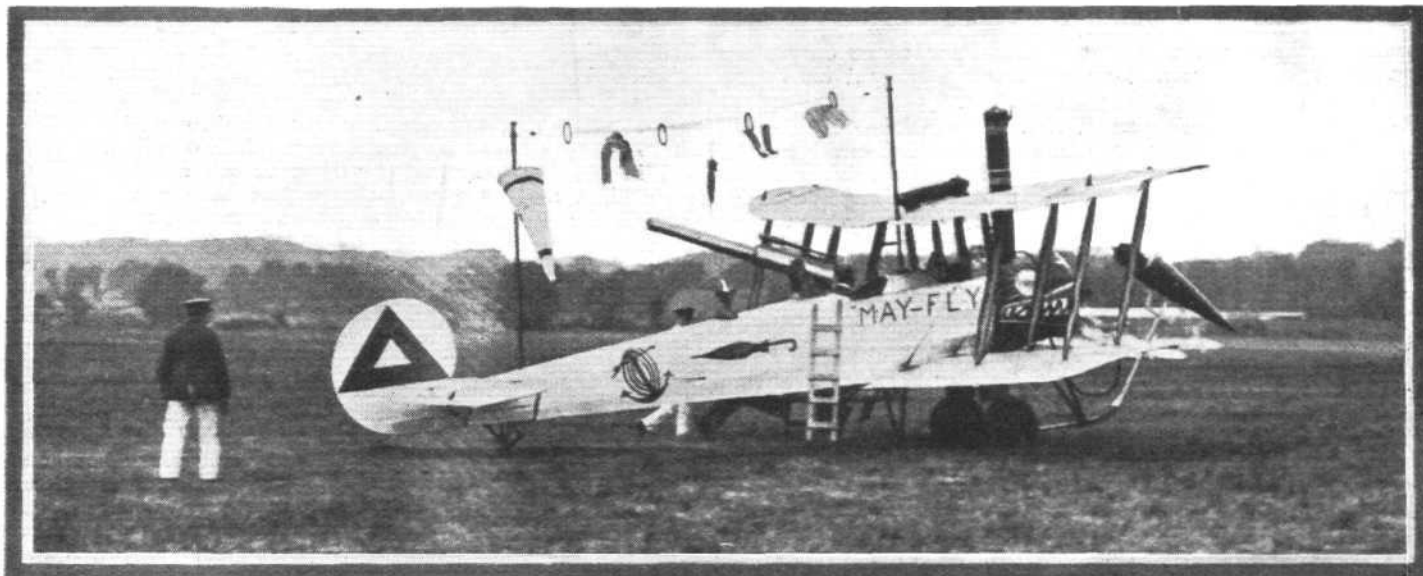
FLIGHT

dived from all directions in rapid succession, with apparently only a few yards separating each machine. They dropped their bombs from about 50 ft. without the use of bomb sights, and nearly every time obtained a direct hit.

Another demonstration followed, by the winners and runners up of a competition, this time in Flight Evolutions, for a Challenge Cup presented by Capt. the Hon. F. E. Guest. This demonstration showed the various evolutions carried out in attacking a single hostile machine or a formation, and the demonstrators were three "Siskins" from No. 41, and three "Grebes" from No. 32 Fighter Squadrons: two Bristol Fighters from No. 24 Communication Squadron representing the enemy aircraft. It was an extremely interesting display, especially to those having a knowledge of air fighting. Whilst waiting to attack the "enemy" the six smaller machines flew around in very close formation—seemingly a few feet apart.

An unexpected event came next. Three "Fawns"

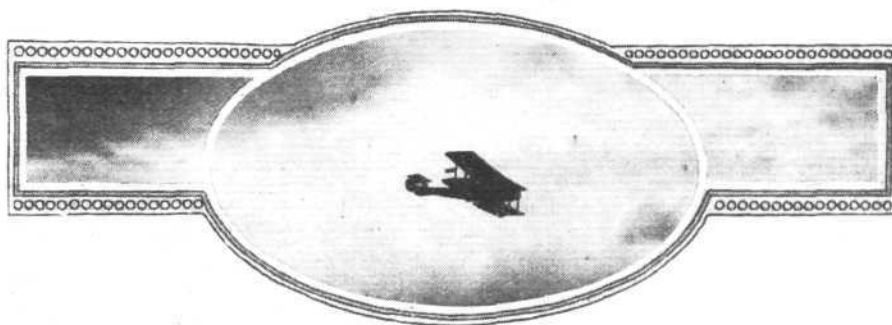
As on previous occasions, the afternoon's proceedings were brought to a conclusion by a spectacular "set piece." Just beyond the centre of the aerodrome could be seen the funnels, masts, etc., of a cruiser (constructed mainly of scrap aircraft material), partly hidden by palms, oojars and other tropical plants. It was supposed to represent an enemy cruiser, the last of the commerce raiders, which had taken refuge up a tropical river, in fancied security. At the moment all was peaceful, and sundry commerce ships were observed sailing to and fro, calling at the port for the empties. Then a Supermarine "Seagull" amphibian came along overhead and "spotted" the cruiser, which promptly opened a heavy fire with her "anties." Strange to say, all her shells burst just a little below and behind the "Seagull." In answer to the latter's S.O.S. five Fairey "Flycatcher" Fleet Fighters flew forward firing frantically at Fritz. This apparently somewhat silenced the "anties" and the "Seagull" and



AT THE R.A.F. DISPLAY : The latest Hush-hush machine, the Orva "May-fly," leaving the Amusement Park at Hendon. Note the 6-in. gun, Carrot accelerator, and wireless clothes-line. Afternoon tea is provided by the kettle seen on the exhaust manifold from the "A.B.C. Lion."

suddenly came in over the aerodrome, and as we watched them pass, a figure was seen to climb over the side of each machine, and to everyone's alarm, jump overboard. They had not fallen far, however, when from each figure a white parachute opened out, as if by magic, changing a rapid head-long fall into a graceful descent. This was the first public demonstration of the new parachute equipment which is being issued to the R.A.F.

"Flycatchers" went off and reported matters to H.Q. After a short interval a fleet of heavy bombers, consisting of three Avro "Aldershots," and nine Vickers "Virginias," arrived on the scene from a base conveniently situated close at hand, and with a few Oh very direct hits put an end to the cruiser's nasty bad habits. And so ended the Sixth R.A.F. Display—some 120 machines taking part, without one single hitch or accident of any description!



SOME IMPRESSIONS OF THE R.A.F. DISPLAY

By Major F. A. de V. Robertson, V.D.

THE R.A.F. Display this year was more educative than in the past five years. It aimed at showing the public the results of the year's work rather than at electrifying them by a sort of circus in the air; and it introduced them to certain squadrons and mentioned the names of their squadron leaders. Most British citizens are apt to shy at anything which savours of combining instruction with amusement; but in this case the innovation was amply justified and, as a result, the Display was considerably more attractive than it has been in the past few years. In fact, many of us thought it the best display the Royal Air Force has ever given. Practically all the events on the programme concerned the practical training of the force. Yet the net was cast wide. It was not only the squadrons of fighters and bombers which showed off their prowess; the various flying schools and instructional units had their own proper events, and the officials of the Air Ministry also had theirs; while the Communication Squadron (No. 24), whose rôle seems less glittering than that of the fighters and the bombers, proved its utility by filling in all the gaps. So far as the Inland Area is concerned, only the three independent flights, *i.e.*, the Inland Area communication flight, the meteorological flight, and the night-flying flight, were not given their chance, and that for obvious reasons. In future years it is to be hoped that the Special Reserve and Auxiliary Air Forces will be given their share in the Display; but their time is not yet.

Almost inevitably the Display is mainly a concern of the Inland Area. Last year the set piece was given over entirely to the Coastal Area; but this year the latter provided the "Seagull" and the five "Flycatchers," while the Inland Area was responsible for the four flights of heavy bombers which destroyed the hostile cruiser. The public probably never stopped to inquire how nine "Virginias" and three "Aldershots" arrived off the coast of Africa, or wherever it was. Last year the use of "Darts," which are ship 'planes, was in keeping with the rest of the plot; but this year land 'plane bombers were substituted, for the sake of variety.

Regarding the Display as mainly a concern of the Inland Area, the A.O.C. of that area, Air-Commodore T. I. Webb Bowen, C.B., C.M.G., deserves high praise both for the high degree of efficiency displayed by all the units concerned and also for the excellent organisation of the display itself. Every engine was run up at the right moment, and every event commenced sharp at the appointed time. Particularly laudable was the manner in which machines got off the ground without distracting attention from the stage, and, so to speak, hid themselves behind the scenes until they got their cue for making their entry. Perhaps the pause between the exit of the "Flycatchers" and the entry of the "Aldershots" and "Virginias" was a trifle long, but only a trifle.

One must also applaud the policy which invited the public to take an interest in the individual squadrons which had proved themselves best in training, and even to indulge the notorious British taste for hero-worship. Authorities must certainly be cautious in putting any service officer too much in the limelight, but that caution was certainly not abandoned in this case; in fact, the happy mean was reached. No. 25 (Fighter) Squadron stood out as the popular heroes of the day, and it would, indeed, be churlish to refuse recognition to Squadron-Leader A. H. Peck, D.S.O., M.C., who had brought them to such a pitch of perfection. Anything more beautifully accurate than the manoeuvres of those nine "Grebes" has seldom been seen either in the air or on the Horse Guards parade ground. When in squadron formation, *i.e.*, a single wedge, the Royal Salute was given by diving down in front of the royal box and promptly climbing again; one wondered how on earth—or, rather, how in the air—each pilot kept his position with such accuracy. Had the machines been linked by ribbons, I do not believe a single link would have been snapped. But the manoeuvre which most excited my admiration was when the squadron in flight mass echelon to port or starboard received the order "Re-form squadron mass." The

flight which was rearmost and on the outside flank (presumably No. 3) would bank and turn inwards, pass across the rear, increase its pace, and take up position on the opposite flank in line with No. 2 flight. And it should be noted each of the three machines banked in such a way that the whole flight banked simultaneously at the same angle, the upper wings of the three "Grebes" being always in the same plane of air. I know no infantry manoeuvre so difficult to execute, and have never seen one executed with greater accuracy.

No. 25 having shown us something of squadron drill, the four bombing squadrons, Nos. 12, 100, 39, and 207, gave a display of wing manoeuvres, and a wing corresponds to a brigade of artillery. The actual words of command and the names of the formations and manoeuvres are still in the experimental stage, and one noted one or two directions in which improvements might be made. In all drill, on land, on sea, and in the air, there is always a theory at the back of everything, and once that theory has been grasped it is possible for a commanding officer to give orders which he has never heard before and even to improvise some not laid down in the drill book and yet quite correct and orthodox. Having grasped what is meant by "squadron mass" and "squadron" (*vide* FLIGHT of June 25, 1925, page 385), it is easy to visualise a "Wing in squadron mass line abreast" and "Wing in line ahead of squadrons."

The sham fighting served to some extent to illustrate the remark of the Chief of the Air Staff that the aeroplane "is a shockingly bad weapon of defence." Defence, of course, means the onslaught of fighters on invading bombers. Now bombers can fire both fore and aft, and fighters, being single-seaters, can only aim by pointing the nose of the machine at the target. Flight-Lieut. Hamersley and Flying-Officer Boothman, of the C.F.S., seemed to have the greatest difficulty in training their guns on to the "Bugle," and to show a very wholesome respect for its rear gunner; while Squadron-Leader Longton in his cumbersome-looking machine appeared to elude their attacks without much difficulty, and unless their attacks were simultaneous the "Bugle" frequently drove them off by its fire. This combat made one wonder whether the modern tendency of making all fighters single-seaters is really wise, and whether a modern successor to the Bristol fighter ought not to be adopted by some at least of our defensive squadrons. Of course, in event No. 9, when a whole flight attacked an enemy machine, a better case seemed to be made out for the single-seater. These problems, it is known, are engaging the serious attention of all the authorities concerned; and we must remember that towards the end of the great war the Bristol Fighters showed a tendency to develop their present rôle of light bombers and general utility machines, and to leave the serious fighting to the "Camels."

Another very gratifying feature of this year's Display was the greatly increased accuracy shown by the Army Co-operation squadrons, Nos. 2, 4, 13, and 16, in picking up messages and particularly in dropping the replies, some of which fell practically into the hands of the expectant infantry; and also the much greater accuracy of the fighters in low bombing. In some recent Displays the tank seemed a pretty safe place of refuge, but on this occasion it was very badly mauled. Evidently bombing can be greatly improved by assiduous practice; and this fact is likely to have a great effect in future wars.

Finally, everyone would like to know when, if ever, is a completely satisfactory Army Co-operation machine to be selected and put on production? The idea embodied in the "Hedgehog" is good, for it relieves the observer of the necessity of using the rear gun and enables him to concentrate on his proper duties. But it would seem that a two-seater light bomber is also required, a modern equivalent for the Bristol Fighter, and now that Parliament and the nation are only too keen to see the Air Force properly equipped, the long delay in evolving that type requires some explanation



FLIGHT



WHEN the regulations for this year's air race for the cup presented by His Majesty the King were first published there were probably few who expected that the entries list would be other than a very small one. It is, therefore, all the more gratifying to find that no less than 15 machines will face the starter at Croydon by about 5.30 a.m. on Friday next, July 3. Surely one may take this as a good omen, and feel justified in believing that this year's King's Cup Race marks the beginning of a revival of air racing in this country. Last year, when the race for the King's Cup was won by Alan J. Cobham on a D.H.50 with Siddeley "Puma" engine, but ten machines took part. The winning machine was entered by Sir Charles Wakefield, who is again among the entrants this year. The fastest time was made in last year's race by Flight-Lieut. Jones on a Siddeley "Siskin," entered by Sir Glynn H. West, whose average speed over the 950 miles course was about 126 m.p.h. In 1923 the race was won by Frank Courtney on a Siddeley "Siskin" at an average speed of 150 m.p.h. The first King's Cup race, flown in 1922, was won by Capt. Barnard on a D.H.4A at an average speed of 130 m.p.h.

It should be pointed out that, in view of the fact that this is a handicap race, the average speeds of the winners are no indication of the speeds attained, except in such cases where the winner is the scratch man.

The course and general planning of this year's King's Cup race are somewhat different from those of previous years in that a closed circuit has to be covered on each of the two days, the machines starting from and finishing at the London Terminal Aerodrome at Croydon.

The actual course to be followed by competitors is shown in the small sketch map given above, and it should be noted that on the first day, Friday, July 3, the direction flown is anti-clockwise, while on the second day, Saturday, July 4, the same course is to be covered, but in the opposite direction. The distance to be flown on each day is 804 miles, or a total of 1,608 miles, which is, it will be realised, a very severe test of machines, engines and pilots, the more so as the race is flown on two consecutive days.

At all the controls shown on the map, except Blackpool, competitors must alight and remain for 30 minutes, except at Renfrew, where a stay of one hour is required. Landings between controls are permitted, but any time spent thus will, of course, count as flying time.

On each day machines will start from Croydon aerodrome, and it is expected that the limit man will leave about 6 a.m., the others following at intervals corresponding to their handicap allowances.

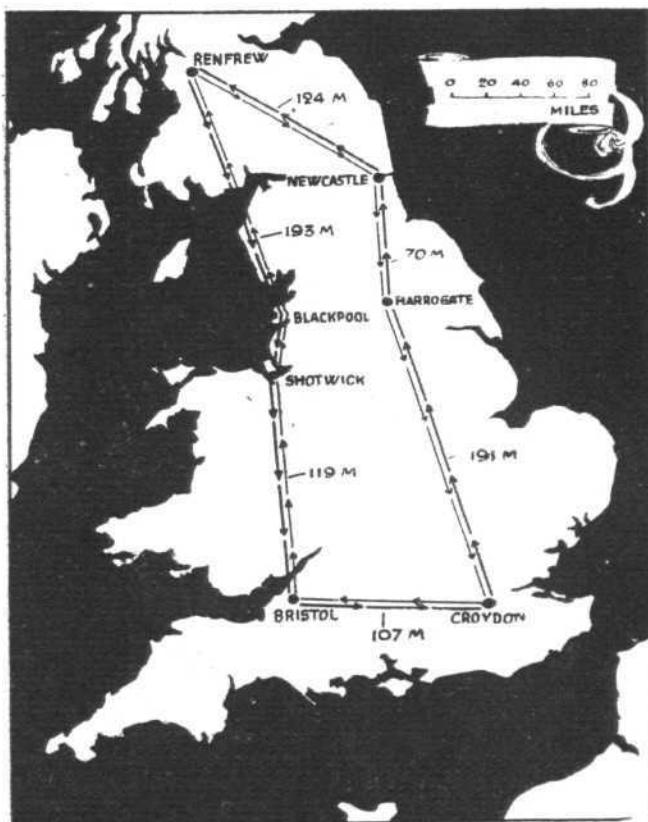
Prizes

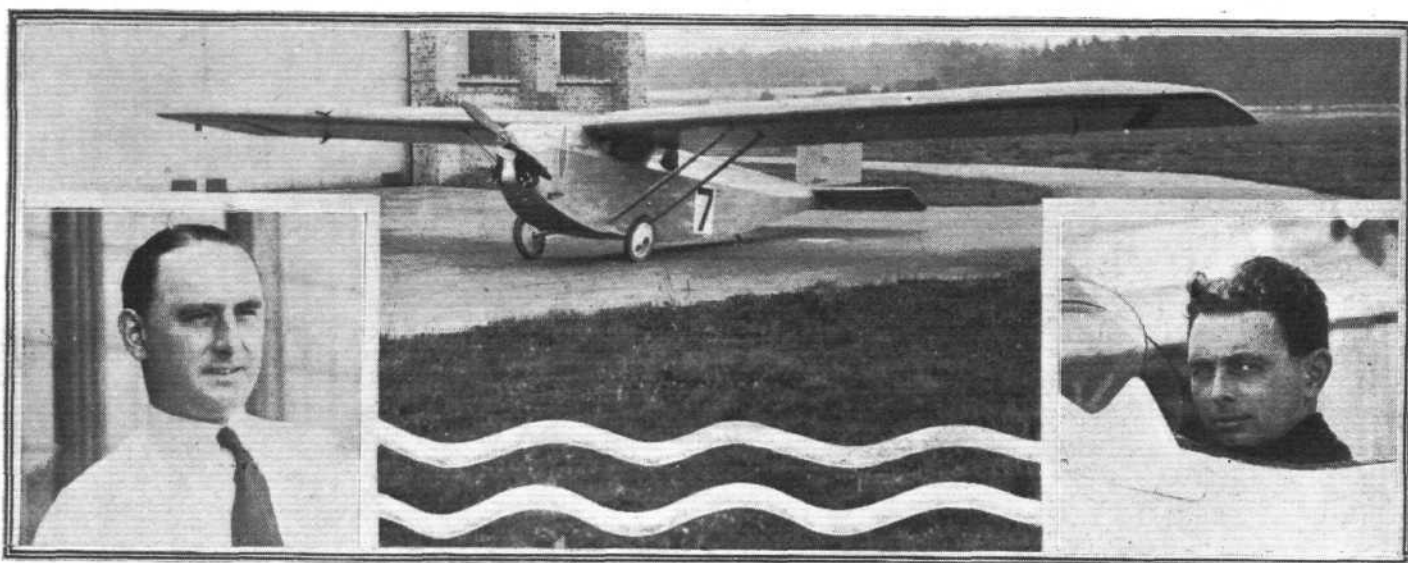
In addition to the cup presented by His Majesty the King, and which goes, of course, to the winner of the race, the following prizes will be awarded: £100 presented by Sir Charles Wakefield to the winner of the King's Cup. £100 presented

by Mr. Samuel Samuel, M.P., to the entrant placed second. £50 presented by the Royal Aero Club to the entrant of the aircraft placed third. £100 presented by residents of Harrogate to the entrant of the aircraft which completes the whole course in the fastest time. £50 presented by residents of Harrogate to the entrant of the aircraft which makes the fastest handicap time to Harrogate on the first day. £50 presented by residents of Harrogate to the entrant of the aircraft which makes the fastest handicap time from the commencement of the race to the Harrogate control on the second day.

The machines taking part in the race for the King's Cup are illustrated in the following pages. It will be seen that they range from small light 'planes with 30 h.p. engines to fast single-seater fighter types with engines of 400 h.p. or more, and it is a curious coincidence that out of the 15 entries but a single one is fitted with a water-cooled engine. This is the de Havilland D.H.37, owned and entered by Mr. A. S. Butler, which is fitted with a Rolls-Royce "Falcon" of 280 h.p.

The other 14 engines are all air-cooled. It will be interesting to see how the single example of water-cooling compares with the air-cooled engines. The types of air-cooled engines represented are: radial, eight-cyl. Vee, two-cyl. Vee, and four-cyl. vertical. To the first class belong the Siddeley "Jaguars" and "Lynx" and Bristol "Jupiters," or, in other words, the most powerful engines. To the second belong the Airdiscos, and to the fourth the "Cirrus" engines, while there is but one Vee-twin, i.e., the Anzani, in the A.N.E.C. monoplane.





The lowest powered machine in the King's Cup Race is the A.N.E.C. monoplane with 30 h.p. Anzani engine, which has been entered by Maj. J. Savage, and will be flown by Mr. "Jimmy" James.



AS the lowest-powered machine entered for the King's Cup Race, considerable interest attaches to the little A.N.E.C. monoplane entered by Major J. C. Savage, of sky-writing fame. In the competition this machine will be piloted by Mr. "Jimmy" James, who thus, curiously enough, has changed over from the fastest machines which this country possesses to the smallest in the race around England. Mr. James will, perhaps, be best remembered as the winner of several Aerial Derbys and as a pilot of fast-racing machines generally. The machine he is flying in the King's Cup Race is the same that he flew in last year's Lympne competitions for light 'planes. In that competition his A.N.E.C. monoplane, built by the Air Navigation and Engineering Company of Addlestone, Surrey, did not get an opportunity to show what it could do, but it is believed that considerable improvements have been made in the British Anzani engine, and that now this engine will be likely to prove much more reliable. It is certainly a very stiff proposition to put before an engine of 30 h.p. only, but if the machine does succeed in covering the whole of the 1,608 miles, the credit will be all the greater.

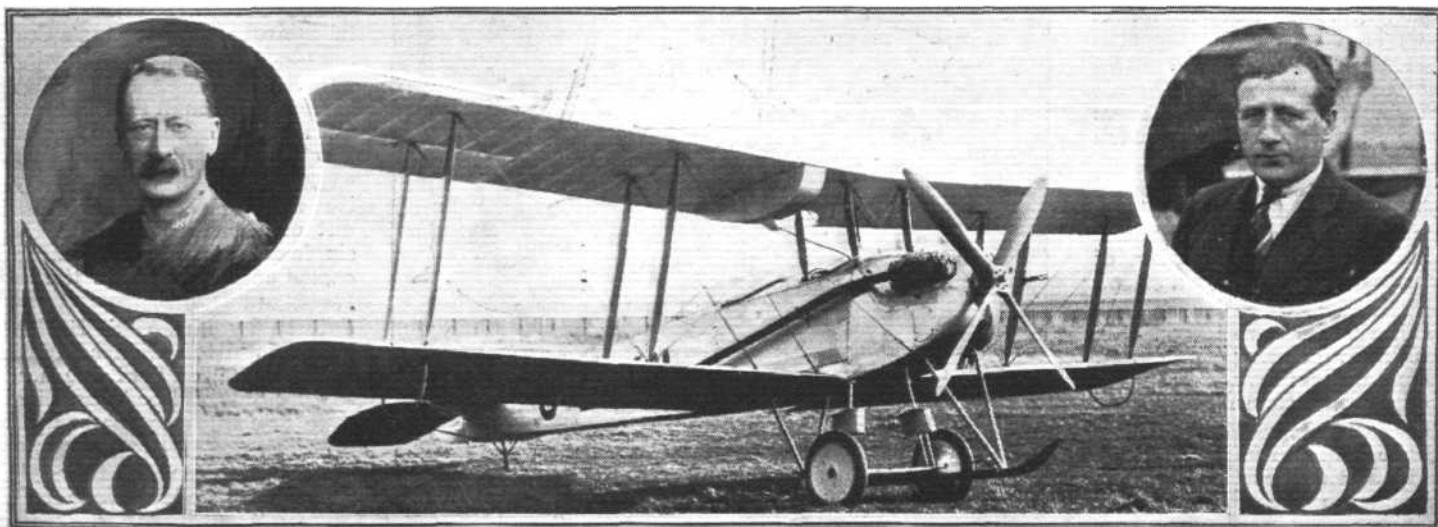
The A.N.E.C. monoplane is a semi-cantilever machine, with short wing struts supporting the two halves of the monoplane wing. Three-ply is used extensively in its construction, but the wing is fabric covered. It was designed by Mr. W. S. Shackleton, who has since become chief designer to Wm. Beardmore & Co., for whom he designed a very similar machine, the "Wee Bee I," which won first prize in last year's competition for light 'planes.



ENTERED by Lieut.-Col. J. Barrett Lennard, and to be piloted by Mr. H. H. Perry, the Airdisco-Avro is a standard Avro biplane of the famous type 504, which has had almost innumerable engines fitted, and which has reached the type number 504 N. The Airdisco-Avro is, however, an Aircraft Disposal Company version, and is fitted with one of the 120 h.p. "Airdisco" engines. These engines, it may be recollected, are R.A.F. engines re-designed by Major Halford, who has succeeded in increasing their power from about 90 h.p. to 120 h.p., without impairing their reliability. Already the "Airdisco" engines are establishing a reputation for themselves, and as they are of a power very convenient for school work they should become very popular. The Avro machine itself is so well and so favourably known throughout the world that there is little need to give a description of it here.

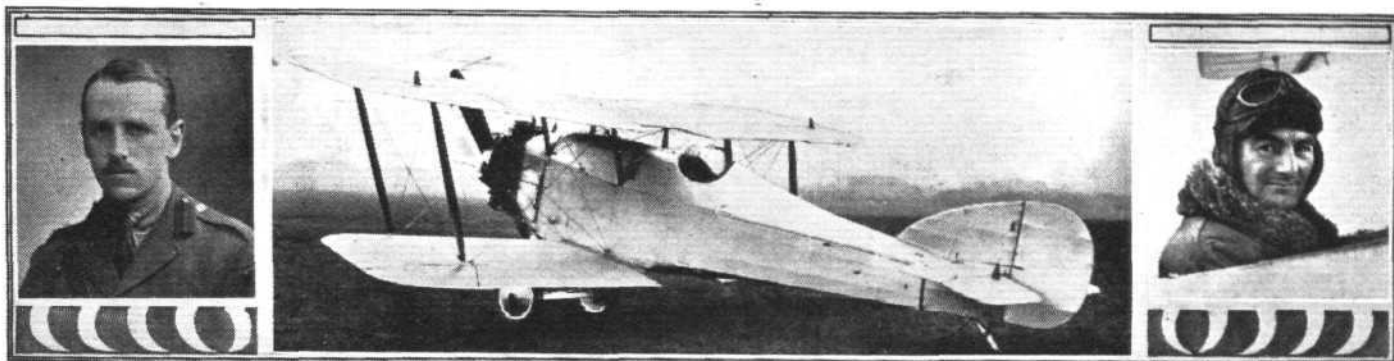
Concerning the entrant and pilot, both of whom are well known in British aviation circles, it will suffice to say that Lieut.-Col. Barrett Lennard is a director in the Aircraft Disposal Company, while Mr. Perry is one of the A.D.C. test pilots at the Waddon factory of the company.

It is, of course, impossible to forecast how any given machine and engine will fare in the race, but provided the handicapping is accurate, the Airdisco-Avro should do well, and there is reason to believe that its engine will not be found to give any trouble at all. Also Mr. Perry is an experienced cross-country pilot and should have no difficulty in flying a very good course, a matter of the very greatest importance in a race around England.



The Airdisco-Avro is a standard Avro biplane, but fitted with 120 h.p. Airdisco engine. The machine has been entered by Colonel Barrett Lennard, and will be piloted by Mr. H. H. Perry

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Entered by Col. M. O. Darby, the Airdisco Martinsyde "A.D.C. I," which will be piloted by Sqdn.-Ldr. W. H. Longton, is fitted with a Siddeley "Jaguar" engine of 395 h.p.



IT is now close upon a year since the Aircraft Disposal Company decided to re-design the Martinsyde F.4 biplane, so as to take the Siddeley "Jaguar" engine. The services of Mr. J. Kenworthy had been secured some time previously, and he, consequently, set to work on remodelling the F.4. The result was the Airdisco-Martinsyde "A.D.C. I," one of which has been entered for the King's Cup Race by Lieut.-Col. M. O. Darby, O.B.E., who is managing director of the Aircraft Disposal Company. It might be mentioned incidentally that this company has taken over the goodwill of the Martinsyde firm of Woking, and that therefore the choice of the F.4 for remodelling was a very natural one.

The "A.D.C. I." has proved a great success, and the machine has been found to have an excellent speed and climb. No actual figures are available, but it is believed that the top speed is at least 160 m.p.h., and probably a little more, so that it should be among the fastest machines in the race. In aircraft circles there is considerable speculation as to which is the faster, the "A.D.C. I." or the Armstrong-Whitworth "Siskin V." Both machines have the same engine, but the Siskin is probably somewhat the smaller machine in the matter of wing area, which should give it some advantage in point of top speed. Both types will be flown by pilots of acknowledged skill, so that provided all the engines are equally free from trouble, there should be a very close race between the two Siskins and the A.D.C. machine.

The pilot of the "A.D.C. I." will be Squadron-Leader W. H. Longton, D.F.C., A.F.C., who is one of Great Britain's finest pilots. He won fame in years gone by with his "crazy flying," which appeared to defy all the accepted theories of flight, but which was, in reality, merely the result of superb skill and judgment. Longton knew exactly how far he could go with any given machine, and he could, therefore, with immunity, perform manœuvres which would have ended in disaster to a pilot of less experience. It is not, however, as a stunt pilot only that Longton shines. He is now at the head of a bombing squadron.



REFERENCE has already been made to the fact that the Avro 504 appears to be immortal. The first Avro of this type appeared somewhere around 1913 or 1914, and was fitted with 80 h.p. Gnome engine. The type soon became popular and for many years has been the standard training machine in the services. It underwent minor modifications in detail, but essentially it remained the same machine as the 1913 prototype. Engines of all sorts were fitted, such as 110 h.p. le Rhone and 130 h.p. Clerget rotaries, Hispano water-cooled, Bristol "Lucifer" air-cooled, and finally the Siddeley "Lynx" with which the King's Cup machine is fitted. The undercarriage has also undergone modifications from time to time, such as the substitution of an oleo chassis for the original central skid and telescopic strut undercarriage, and specimens have appeared as twin float seaplanes, and very successful seaplanes at that, so that it will be seen that there seems to be no limit to the adaptability of the 504. The type shown in the Photograph is the 504N, but is more generally known as the "Avro-Lynx," from the fact that it is fitted with 180 h.p. Siddeley "Lynx" engine.

The Avro 504N has been entered for the King's Cup Race by Mr. A. V. Roe, one of the pioneers of aviation in Great Britain, and the originator of the tractor type of biplane, a type which has now to all intents and purposes become the standard single-engined aeroplane. Mr. Roe first flew in 1909, on a triplane of his own design and having an engine of 9 h.p. only.

In the race the "Avro-Lynx" will be piloted by Bert Hinkler, who is now Avro's chief test pilot. Mr. Hinkler will be familiar to all readers of FLIGHT, mainly, perhaps, for some of his now famous flights on the Avro "Baby" with 35 h.p. Green engine, among which we mention but the non-stop flight from London to Turin and several equally great flights in Australia. Mr. Hinkler is, however, just as much at home in larger machines, and flies an Avro with 1,000 h.p. Napier "Cub" engine, with as much skill and judgment as that which he more familiarly shows in handling small machines. Hinkler is one of our most popular pilots and everyone will wish him success in this year's King's Cup Race.



The "Avro-Lynx," or 504 N., with 180 h.p. Siddeley "Lynx" engine, has been entered by Mr. A. V. Roe, and will be piloted by Mr. Bert Hinkler.



The Armstrong-Whitworth "Siskin" with 395 h.p. Armstrong Siddeley "Jaguar" engine is taking part in the King's Cup race in three examples, one of which is of the type IV and two of the type V. The two Siskin V's have been entered by Sir Eric Geddes and Major F. M. Green, and will be piloted by Capt. F. L. Barnard and Capt. J. L. N. B. Baggs, respectively. The Siskin IV has been entered by Sir Glynn H. West, and will be piloted by Flight-Lieut. H. W. G. Jones



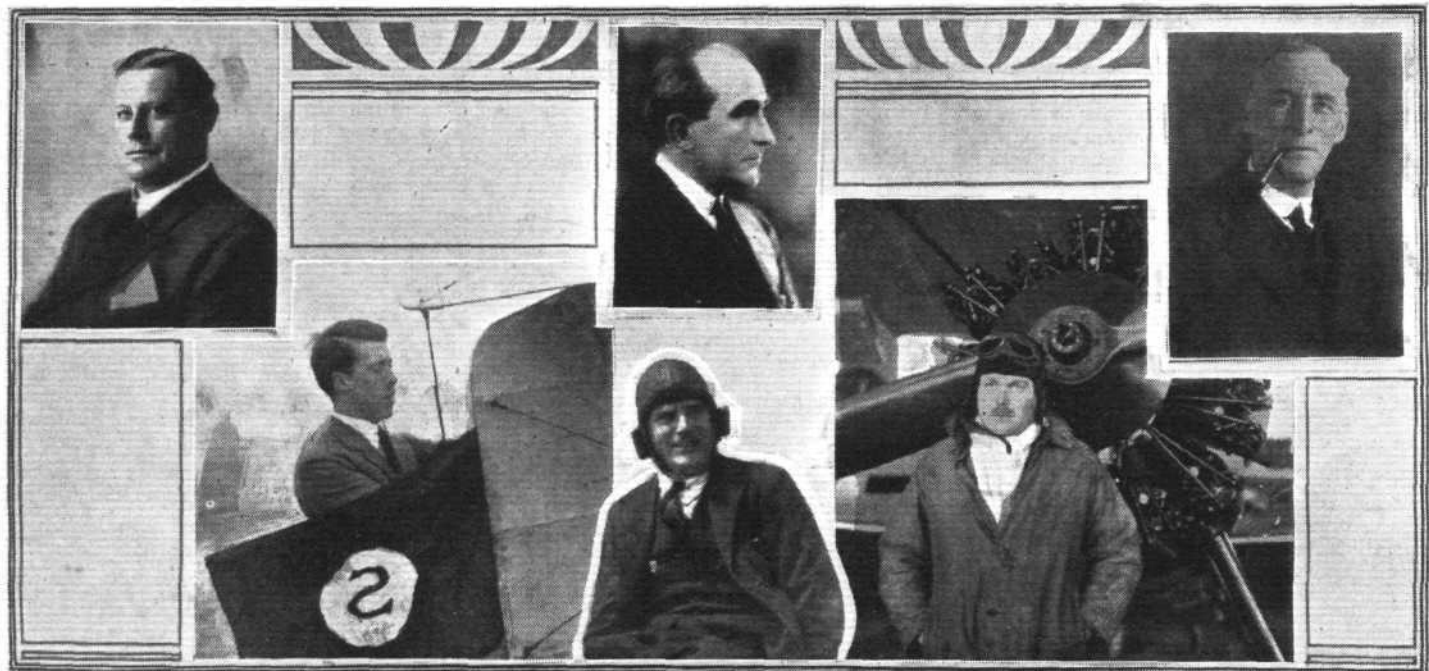
ONE of the firms best represented in the King's Cup Race is Sir W. G. Armstrong Whitworth Aircraft, Ltd., of Coventry, who have no less than four machines in the race, of which three are "Siskins" and the fourth a new two-seater biplane, the "Ajax." It is almost superfluous to state that all four machines are fitted with Siddeley "Jaguar" engines of 395 h.p., since the Armstrong Whitworth and Armstrong Siddeley firms are now allied. The "Siskin" aeroplanes are already well known to readers of FLIGHT, a long series of them having been produced at the Coventry works for the Royal Air Force and the "family" having already reached the suffix V. One of the three "Siskins" entered for the King's Cup Race is of the type IV, and the other two of the type V, i.e., the latest model. Generally speaking the two types are similar, but we understand that the "Siskin IV" has slightly smaller wing area than the type V and presumably, therefore, is somewhat faster. It would appear likely that the type IV is the fastest machine in the race, although as pointed out in our notes on the Airdisco "A.D.C.I." that machine is probably very

nearly if not quite as fast, so that it should be a very close race between the three "Siskins" and the "A.D.C.I."

The "Siskin IV" has been entered by Sir Glynn Hamilton West, who also entered a "Siskin" in last year's race, and it will be piloted by Flight-Lieutenant H. W. G. Jones, M.C., who was the pilot of Sir Glynn's machine last year. One of the "Siskin V" machines has been entered by Sir Eric Geddes, G.C.B., G.B.E., managing director of Imperial Airways, Ltd., and will be flown in the race by Capt. F. L. Barnard, the well-known airways pilot, who won the first King's Cup Race in 1922 on a D.H. 4A belonging to Sir Samuel Instone.

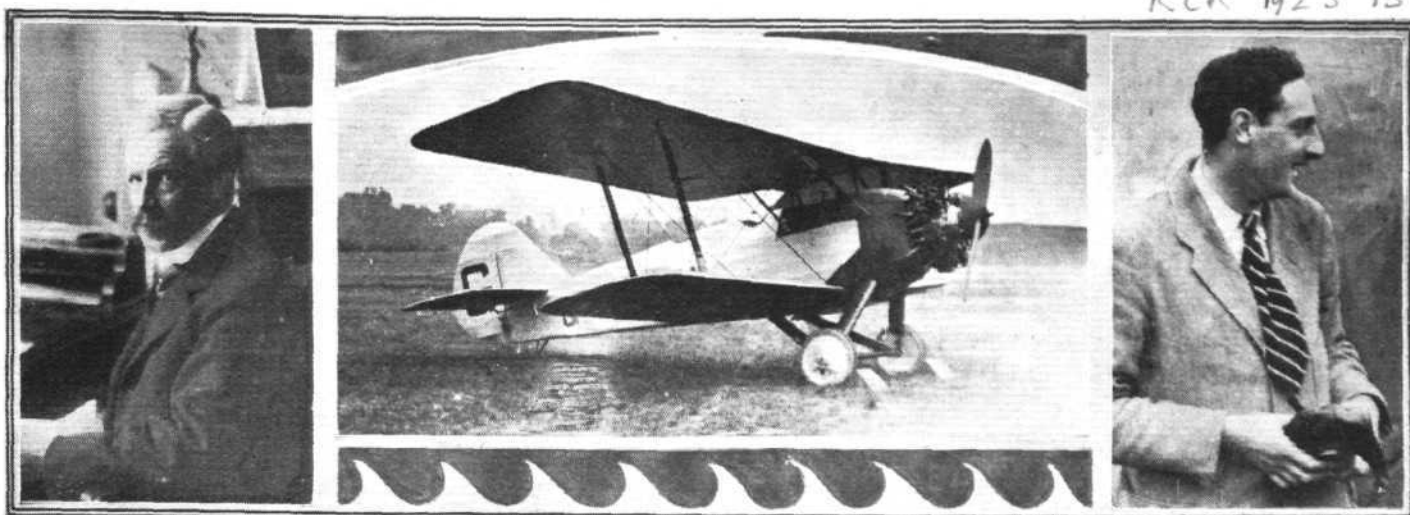
The second "Siskin V" has been entered by Major F. M. Green, who is at the head of the technical staff of the Armstrong Whitworth Aircraft firm, and who has, among other things, done a great deal of work on all-metal construction, special forms of which have been developed during recent years at the Coventry works of this firm. Incidentally it may be mentioned that the latest types of "Siskins" are of all-metal construction, as are also several other machines now being produced at Coventry.

Capt. J. L. N. Bennett Baggs, who will pilot Mr. Green's



THREE "SISKIN" ENTRANTS AND THEIR PILOTS: One "Siskin" IV and two "Siskin" V's, all with Siddeley "Jaguar" engines, are taking part in the King's Cup Race; one entered by Sir Eric Geddes, one by Sir Glynn Hamilton West, and one by Major F. M. Green. The three pilots who will fly the "Siskins" are Capt. F. L. Barnard, Flight-Lieut. H. W. G. Jones, and J. L. N. B. Baggs, respectively.

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The Armstrong-Whitworth "Ajax," entered by Mr. J. D. Siddeley, is a two-seater biplane fitted with 395 h.p. Siddeley "Jaguar" engine. In the competition this machine will be piloted by Mr. Frank Courtney.

"Siskin V," is making his debut as a racing pilot in this year's King's Cup Race. After transferring from the R.A.F. to the Reserve in 1919 he took up civilian flying with Armstrong Whitworths, with whom he has remained as a flying instructor and test pilot ever since.

An entirely new machine as far as the general public is concerned is the Armstrong Whitworth "Ajax," entered by Mr. J. D. Siddeley, C.B.E., managing director of Armstrong Whitworth Aircraft and of Armstrong Siddeley Motors, Ltd. The "Ajax" is a small two-seater biplane with Siddeley "Jaguar" engine. The general appearance is indicated by the accompanying photograph, and it is regretted that detail particulars of this machine are not available for publication in this issue of FLIGHT. The machine is believed to be fairly fast, and should put up a very good performance in the race.

It will be piloted by Mr. Frank Courtney, one of the best known British test pilots and winner of the King's Cup Race in 1923. In last year's King's Cup Race Courtney's spinner broke in the air and he had to retire from the race. All will wish him better luck this year.



BRISTOL aeroplanes were among the first British machines to make aviation history, and the firm can justly claim to be one of the pioneer aircraft firms of the country. During the last few years the Bristol Aeroplane Company has refrained from taking an active part in air racing with large aeroplanes (it will be remembered that two Bristol light monoplanes took part in last year's Lympne competition), although Bristol aero engines have been extensively used. It is therefore all the more gratifying to find a Bristol machine in this year's King's Cup Race.

The Bristol aeroplane entered by Sir G. Stanley White, Bart., is the "Bloodhound," a two-seater fighter of all-metal construction. The first "Bloodhound" was designed by Mr. Reid, but the present machine has been re-designed by Capt. Barnwell upon his return from Australia, where he spent some time in the Australian Air Force, but from where he returned a couple of years ago to take up his old position as chief designer to the Bristol Company.

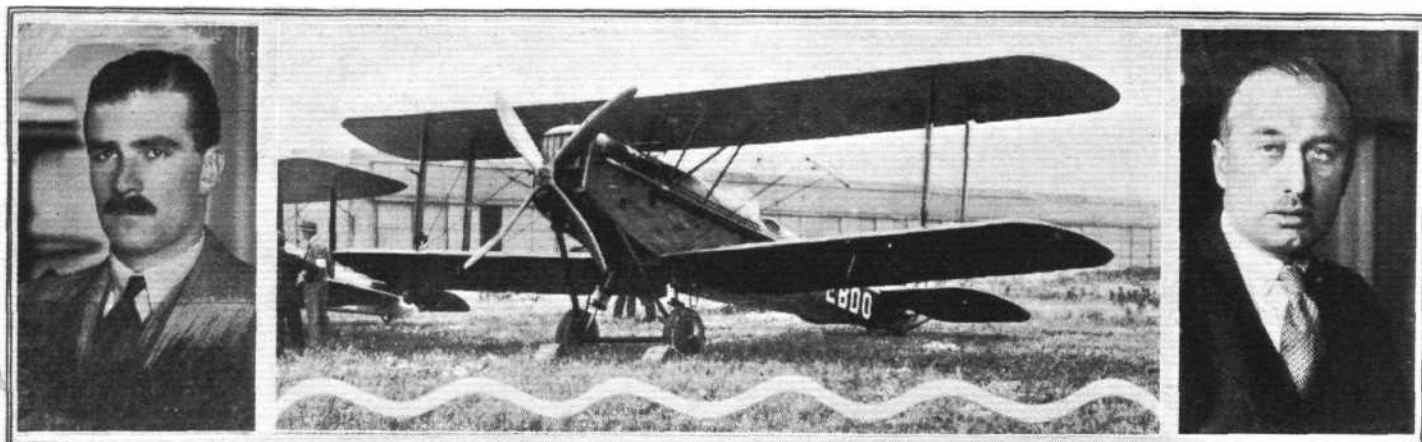
The Bristol "Bloodhound" is normally a two-seater fighter of, as already mentioned, all-metal construction. Perhaps its most characteristic feature is the back-swept wings, which have enabled the designer to arrange the position of the crew in such a manner as to give an exceptionally fine view in all directions. The engine fitted in the "Bloodhound" is a Bristol "Jupiter" of 400 h.p., a radial air-cooled which has established a splendid reputation abroad no less than at home, being manufactured under licence in France, Italy and Czechoslovakia.

We regret extremely that it has not been found possible to publish in this issue of FLIGHT a portrait of Sir G. Stanley White, Bart., and that thus our series of portraits of entrants of machines for the King's Cup Race is incomplete. Sir G. Stanley White is of a very reticent disposition, and we doubt whether there is in existence a photograph of him; certainly none has ever been published so far as we are aware.

The Bristol "Bloodhound" will be piloted by Mr. T. W. Campbell, one of the instructors at the Bristol flying school and test pilot to the Bristol Aeroplane Company. Mr. Campbell, it will be remembered, of the Bristol light monoplanes in Lympne light 'plane last year's competition.



The Bristol "Bloodhound," entered by Sir G. Stanley White, is an all-metal biplane with 400 h.p. Bristol "Jupiter" engine. It will be piloted by Mr. T. W. Campbell.



Mr. A. S. Butler has entered his D.H. 37 "Sylvia," which will be piloted by Major H. Hemming. The engine is a 280 h.p. Rolls-Royce "Falcon," the only water-cooled engine in the race

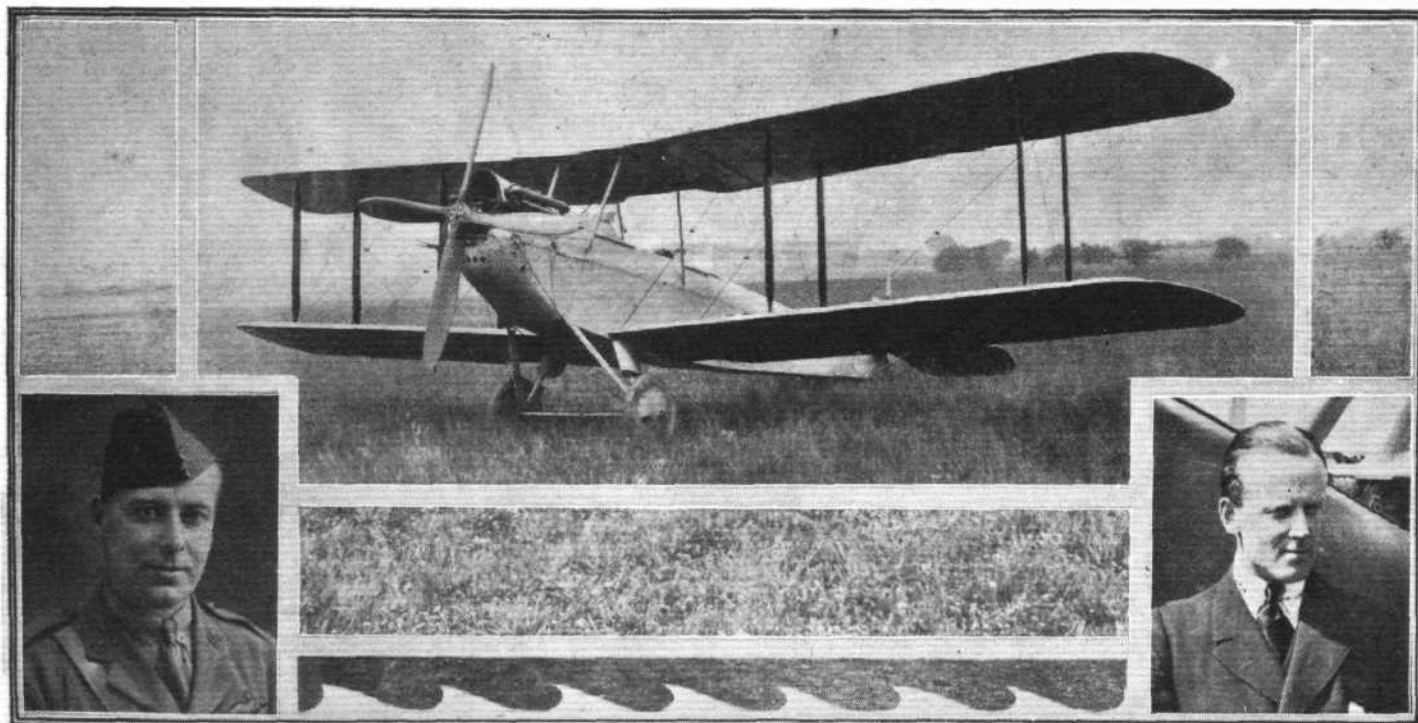
NO less than five de Havilland machines are taking part in this year's King's Cup Race, and thus the de Havilland Aircraft Company is represented by the largest number of machines of any individual company. This firm has for a number of years specialised particularly in commercial and sporting aircraft, and so it is but natural that, as distinct from the majority of other machines taking part, the de Havilland aeroplanes are all civilian types purely and simply. One misses from this year's entries list the famous D.H.50 on which Alan J. Cobham won last year's King's Cup Race, and on which he has made so many famous flights, such as to Africa in a day and London-Rangoon-London, but, on the other hand, two de Havillands of quite new type are taking part, and two of a type that has not hitherto taken part in air racing, so that the firm can be said to have more than made up with new machines for what we are missing through the absence of the faithful D.H.50.

The only really old type of de Havilland machine flying in this year's King's Cup Race is the D.H.37, entered by Mr. Alan S. Butler, who is a director in the de Havilland Aircraft Company and one of our too few owner pilots. Mr. Butler ordered the D.H.37 for his own private use some years ago, and has since then taken part in a number of races on this machine, as well as used it extensively for touring purposes. Not long ago Mr. Butler made a long tour of Southern and Central Europe on "Sylvia," as his D.H.37 is christened. The

machine is a two-seater biplane of typical "D.H." appearance, and fitted with a 280 h.p. Rolls-Royce "Falcon" engine. Incidentally it is of interest to note that this is the only water-cooled engine in this year's King's Cup Race.

This year the D.H.37 will not be piloted by its owner, but by Major H. Hemming, M.C., who is managing director of the Aircraft Operating Company. Major Hemming has done a good deal of flying on de Havilland machines of recent years, and it may be recollected that he was the pilot of one of the D.H.53 light monoplanes in the 1923 Lympne competition.

Two machines of the D.H.51A-type have been entered, one by Air-Commodore J. G. Weir, C.M.G., and the other by "Steve" Donoghue, the famous jockey. The two machines are of the same type, but differ somewhat in their wing arrangement. Air-Commodore Weir's machine has the usual two pairs of inter-plane struts, while Mr. Donoghue's machine has slightly smaller wings and but one pair of struts on each side. In other respects the two machines are almost identical. The D.H.51 was designed for school work and for use by the private owner, and, although not by any means a "light" plane, it is a fairly low-power machine and should be reasonably cheap to buy and to run. The original machine was fitted with R.A.F. 90 h.p. engine, but the King's Cup machines will be fitted with the slightly more powerful "Airdisco" engine of 120 h.p. With this engine the D.H.51 has a very good performance, and the type is stated to be particularly comfortable and easy to fly. The "Airdisco," by the way was developed from the R.A.F. engine by Major Halford, and is produced by the Aircraft Disposal Company.



The D.H. 51a with 120 h.p. Airdisco engine has been entered by Air-Commodore J. G. Weir, and will be piloted by Colonel the Master of Sempill

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The D.H. 51a, with 120 h.p. Airdisco engine has been entered by "Steve" Donoghue, and will be piloted by Capt. C. D. Barnard. This machine differs from that entered by Air-Commodore Weir in having one pair of inter-plane struts only.

The pilot of Air-Commodore Weir's D.H.51A will be Colonel the Master of Sempill, who did excellent work during the war, and who since the war was in charge of the British Aviation Mission to Japan, a mission which did a great deal of good in the interests of British aviation, and upon whose experiences Col. Sempill lectured before the Royal Aeronautical Society and later before the Scientific Aeronautical Society in Germany.

The second D.H.51, entered by Donoghue, will be piloted by the well-known de Havilland pilot, Capt. C. D. Barnard, who has been with the de Havilland Aircraft Company for many years, and who is doing a lot of very valuable work in one way or another, without somehow attracting as much public attention as he deserves.

"Steve" Donoghue needs no introduction by us, but we wish to take this opportunity of welcoming him into the ranks of British private aeroplane owners. ("Steve" was recently presented with an aeroplane by the owner of one of the horses which he rode to victory.)

The remaining two de Havilland machines are of the light 'plane type, D.H.60, fitted with Aircraft Disposal Company "Cirrus" engines of 60-65 h.p. Known as the "Moth,"

the de Havilland type 60 is the low-power two-seater biplane which has been chosen by the various light 'plane clubs as their standard machine, and a large number of these machines are now nearing completion at the Stag Lane Aerodrome works of the de Havilland Aircraft Company.

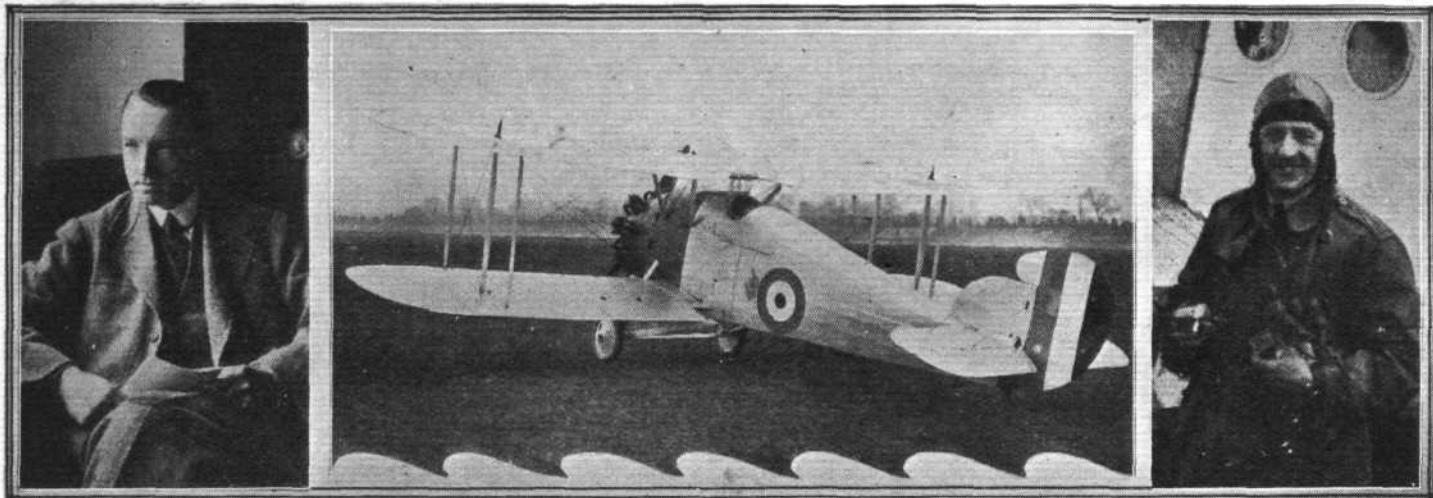
The "Cirrus" engine is a four-cylinder in-line air-cooled, developing about 65 h.p. maximum. Like the "Airdisco" engine it was designed by Maj. Halford, and in fact it uses the same parts as the larger engine, the only exception being the crankcase, which is, of course, entirely different.

In the race one machine has been entered and will be flown by Capt. Geoffrey de Havilland himself. In addition to being technical director of the firm bearing his name, Capt. de Havilland is one of the pioneers of British aviation, and, incidentally, he will be the only designer-pilot in the King's Cup race.

The second D.H. "Moth" has been entered by Sir Charles Wakefield, Bart., who has long made himself a champion of the light 'plane and who will thus fittingly be represented by a machine of this type. His pilot in the race will be Mr. Alan J. Cobham, who needs no introduction to readers of "FLIGHT."



Two De Havilland "Moths" with 65 h.p. "Cirrus" engines are taking part in the King's Cup race. One has been entered and will be piloted by Cap. G. de Havilland, and the other has been entered by Sir Charles Wakefield and will be flown by Mr. Alan J. Cobham. The machine shown in our photograph is the one entered by Sir Charles Wakefield.



The Hawker "Woodcock" with 400 h.p. Bristol "Jupiter" engine, entered by Mr. T. O. M. Sopwith, will be piloted by Flight-Lieut. P. W. S. Bulman.



FAMILIAR to readers of FLIGHT since the earliest days of flying in Great Britain, is the name of Sopwith, and although the title of the firm is now become Hawker, scarcely less famous in the history of aviation, Mr. T. O. M. Sopwith, C.B.E., is still the moving spirit of the company and has entered for the King's Cup Race a Hawker "Woodcock" with 400 h.p. Bristol "Jupiter" engine. Unfortunately the "Woodcock" is, in its normal form, a single-seater fighter and may not, therefore, be referred to in detail. The photograph shows, however, the general appearance of the machine, which is of normal design inasmuch as it is a two-bay tractor biplane with standard wing bracing. In a later and slightly modified form, incorporating all-metal construction, the machine is produced as the "Heron," one of which took part in the "Fly-Past" at the R.A.F. Display at Hendon last week. The "Woodcock" is very fast and may be another serious competitor to the "Siskins" and "A.D.C. I." It is, however, in no sense a racing machine, being built for quite a different purpose, and numbers of "Woodcocks" are beginning to make their appearance at the homes of some of our fighting squadrons.

As already mentioned, the Hawker "Woodcock" has been entered by Mr. T. O. M. Sopwith, C.B.E., and will be piloted in the King's Cup Race by Flight-Lieutenant Bulman, who, as announced in FLIGHT last week, has joined the Hawker Engineering Company as chief test pilot. Flight-Lieut. Bulman is regarded as one of the very finest of British pilots, and has been doing some exceptionally valuable work at the Royal Aircraft Establishment at Farnborough, where he has been carrying out experiments relating to the manoeuvrability and stability of aircraft. It was, it will be recollected, Mr. Bulman who demonstrated the slot-wing Avro at the "Controllitis" demonstration at Croydon some months ago. His acquisition by the Hawker firm should be a great advantage, although his work will be greatly missed at the R.A.E.

It may be remembered that Mr. F. P. Raynham was originally entered as pilot of the "Woodcock," but when the Hawker Engineering Company secured the services of Bulman and wished to have him fly the machine, Mr. Raynham very sportingly stood aside. The consequence is that Raynham has no mount in the King's Cup Race, a fact that will be greatly regretted by his many friends, and also by the general public, with whom Fred. Raynham has for many years been a great favourite.

COMPETITORS IN KING'S CUP RACE

Ident. Letters	Machine and Engine	Entrant	Pilot	Starting Time (First Day)			H'cap Allow- ance on 2 Circuits		
				h.	m.	s.	h.	m.	s.
G-EBKU	D.H.60, 65 h.p. C. ..	Capt. G. de Havilland	Capt. G. de Havilland	6	0	0	7	45	42
G-EBKT..	D.H.60, 65 h.p. C. ..	Sir Ch. Wakefield ..	A. J. Cobham ..	6	0	0	7	45	42
G-EBKN	Airdisco Avro, 120 h.p. A..	Lt.-Col. Barrett Lennard	H. H. Perry ..	6	45	11	6	15	20
G-EBIL ..	A.N.E.C., 30 h.p. Anzani ..	Maj. J. C. Savage ..	J. H. James ..	6	52	50	6	00	02
G-EBIQ ..	D.H.51A, 120 h.p. A. ..	Air Com. J. G. Weir ..	Col. Master of Sempill	6	57	49	5	50	04
G-EBIM ..	D H 51A, 120 h.p. A. ..	S. Donoghue ..	Capt. C. D. Barnard ..	7	05	05	5	35	32
G-EBKQ	Avro 504N, 180 h.p. L. ..	A. V. Roe ..	B. Hinkler ..	7	25	39	4	54	24
G-EBDO..	D.H.37, 275 h.p. R.R. ..	A. S. Butler ..	Maj. H. Hemming ..	8	16	16	3	13	10
G-EBGG	Bristol "Bloodhound," 400 h.p. Ju.	Sir G. Stanley White	T. W. Campbell ..	8	51	08	2	03	26
G-EBLM..	A.W. "AJAX," 395 h.p. Ja.	J. D. Siddeley ..	F. Courtney ..	9	05	05	1	35	32
G-EBMA..	Hawker "Woodcock," 400 h.p. Ju.	T. O. M. Sopwith ..	Maj. P. W. B. Bulman	9	12	58	1	19	46
G-EBKL..	A.D.C. I, 395 h.p. Ja. ..	Lt.-Col. M. O. Darby ..	Sq.-Ldr. W. H. Longton	9	27	44	0	50	14
G-EBLN..	A. W. Siskin V, 395 h.p. Ja.	Maj. F. M. Green ..	Capt. J. L. N. B. Baggs	9	47	43	0	10	16
G-EBLQ	A. W. Siskin V, 395 h.p. Ja	Sir Eric Geddes ..	Capt. F. L. Barnard ..	9	47	43	0	10	16
G-EBLL	A. W. Siskin IV, 395 h.p. Ja.	Sir Glynn H. West ..	Fl.-Lt. H. W. G. Jones	9	52	51	Scratch		

Abbreviations — A = "Airdisco"; C = "Cirrus"; L = Armstrong-Siddeley "Lynx"; Ju = Bristol "Jupiter"; Ja = Armstrong-Siddeley "Jaguar"; R.R. = Rolls-Royce "Falcon."



The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, June 24, 1925, when there were present:—The Duke of Sutherland, in the Chair; Lieut.-Col. M. O. Darby, O.B.E.; Lieut.-Col. John D. Dunville, C.B.E.; Lord Edward A. Grosvenor; Wing-Commander T. O'B. Hubbard, M.C., A.F.C.; Lieut.-Col. F. K. McClean, A.F.C.; Lieut.-Col. M. O'Gorman, C.B.; Mr. F. Handley Page, C.B.E.; Maj. S. V. Sippe, D.S.O.; Mr. T. O. M. Sopwith, C.B.E.; and the Secretary.

Election of Members.—The following new Members were elected:—

John Edward Chorlton.
Robert Miller Stirling.
Kenneth Robertson.
Cyril John Pym.
Gerald Arthur Atkinson.
Flight-Lieut. Frank Ormond Soden.
Vincent Neville Dickinson.
Gaspard Ponsonby.
Flight-Lieut. Charles Goldby Hetherington.
Claude Miller.
Flying Officer William Alan Foot.
Flying Officer S. B. Croyden.
Arthur Hammond Dalton.
Frederick Ellam.
William Lawrence Langley Taylor.
Robert Ducas.

Racing Committee.—The report of the Racing Committee was received and adopted.

The report dealt with the following matters:—

The King's Cup Air Race.
August Race Meeting at Lympne.
Light Aeroplane Competition, 1926.

Federation Aeronautique Internationale.—Lieut.-Col. M. O'Gorman, C.B., was appointed the Club's delegate to attend the Conference to be held at Prague on September 19 to 25 next.

It was decided that the Club should put forward a proposal to the Conference to limit the landing speed of aircraft in all high-speed races to 75 m.p.h.

London Aeroplane Club.—The formation of the London Aeroplane Club to carry out the Air Council's scheme for light aeroplanes was reported, and the following were appointed as the first Committee and directors:—

Lieut.-Col. F. K. McClean, A.F.C.
Wing-Commander T. O'B. Hubbard, M.C., A.F.C.
Maj. R. H. Mayo.
Col. the Master of Sempill.
Capt. C. B. Wilson, M.C.

The King's Cup Air Race.—The following timekeepers were appointed:—

Croydon.—Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Harrogate.—A. Fattorini.
Newcastle-on-Tyne.—Maj. B. M. Dodds.
Renfrew.—A. G. Rennie.
Shotwick.—Wing-Commander T. O'B. Hubbard, M.C., A.F.C.
Bristol.—A. G. Reynolds.

Racing Fund.—The following donations were reported:—

	£	s.	d.
Sir Charles Greenway, Bart.	100	0	0
Maj. T. P. Searight	5	5	0
Blackpool Corporation	50	0	0
Blackpool Tower, Ltd.	25	0	0

Customs Carnet for Touring Aircraft Abroad.—It was reported that the Customs Carnet for Touring Aircraft had been finally approved and was now in force. The exchange of guarantees with the Aero Clubs of the following countries was reported: Switzerland, Holland, Italy, France, Belgium, Roumania, and Great Britain.

The issue of the Carnet in Great Britain is in the hands of the Royal Aero Club, and a fee of £1 1s. will be charged for each carnet.

THE KING'S CUP, JULY 3 AND 4, 1925

Start and Finish Croydon Aerodrome

THE start each morning will be about six o'clock and competitors are expected to return to Croydon each evening between five and seven o'clock.

The Royal Aero Club has decided to admit the public free to the north-west corner of Croydon Aerodrome.

There will be a special reserved enclosure on the south-west end of the aerodrome for which a charge of 2s. will be made. Motor cars will also be charged 2s.

Members and associates of the Royal Aero Club and the London Aeroplane Club will be admitted free on presentation of their membership badges.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary

Air Liner to Follow Progress of King's Cup Race

ALTHOUGH not entered in the race, a large D.H.34 commercial aeroplane, with 450-h.p. Napier "Lion" engine, will, we understand, cover the entire course of the King's Cup Race. This machine, which is the property of Imperial Airways, Ltd., will be piloted by Capt. Hinchcliffe, and will carry, in addition, a mechanic and five passengers. It is hoped to make landings at all the controls on both days.

To the Pole by Air

CAPT. AMUNDSEN has stated that he intends to make another attempt to reach the Pole by air. It is further reported that Norwegian men of science are making an appeal to their countrymen to form an Amundsen Fund for the promotion of Norwegian geographical research similar to the Nansen Fund created in 1896. The German Zeppelin constructor, Dr. Eckener, has sent a telegram to Captain Amundsen wherein he expresses the hope that Amundsen will co-operate in his new Polar expedition with Zeppelins—referring, no doubt, to the same plan which Dr. Eckener discussed with Dr. Nansen during his visit to Berlin recently.

Air Manœuvres in Somerset

MOST of the bombing aircraft which took part in the R.A.F. Display at Hendon on Saturday, proceeded after

the "show" to Weston Zoyland, near Bridgwater in Somerset, where they will take part in a series of air-defence manœuvres.

A New Gyro-Control Tested

A NEW gyroscopic-rudder control for aircraft evolved at the Royal Aircraft Establishment, Farnborough, has been tested on a three-engined Handley-Page operated by Imperial Airways between London and the Continent. It is stated that this device will maintain the machine automatically on any desired compass course, without any action on the part of the pilot other than setting the device to the particular course. It can be put out of action at any moment, and normal control resumed. Pilots who have tested this gyro-rudder control state that the mechanical labour is considerably reduced by its use and that they can leave the machine to itself for long periods.

Transfer of Air Ministers' Offices

THE Air Ministry announces that Sir Samuel Hoare, Secretary of State for Air, and Sir Philip Sassoon, Under Secretary of State for Air, with their personal staffs, have removed their offices from Adastral House, Kingsway, to Gwydyr House, Whitehall, which will in future be their official address. The Air Ministry as a whole remains at Adastral House.

AIR MINISTRY NOTICES

Denmark: Kastrup Aerodrome, Customs Regulations

It is notified that—

1. The following regulations have been issued by the Danish Government:—

All civil aeroplanes entering or leaving Denmark must land for the first time at, or depart from, the civil customs aerodrome at Kastrup, Copenhagen.

2. Copenhagen (Kastrup).—Civil customs aerodrome.

Position.—Lat. 55° 37' N., Long. 12° 39' E. Situated immediately S.S.E. of Kastrup village and 8 kms. S.E. of Copenhagen.

Description.—Good level surface, about 1,000 by 800 m.

No further details are available at present.

(No. 34 of 1925.)

GROUND ENGINEERS

Rolls Royce "Eagle VIII" Engine: Modifications

1. THE undermentioned modifications, (1) to (9), all of which have been individually established for several years are considered essential and must be included in any "Eagle VIII" engine, which does not already contain them before it is passed as airworthy:—

(1) Planet wheel bolts of the Oldham coupling type epicyclic gear must be replaced by the new bolt of the hollow or drilled type.

(2) The ball bearing for the planet wheel of the Oldham type epicyclic gear must be one with 11 balls. Hoffman bearing with 10 balls must be replaced.

(3) Drain holes must be provided to prevent an accumulation of oil in the starter casing.

(4) Pistons with compression ratio of 5 to 1 only may be fitted with those engines having the Oldham coupling type epicyclic gear. High compression pistons with 5.3 to 1 ratio may only be used on engines fitted with the friction type epicyclic gear.

(5) Exhaust manifolds with the old form of welding must be replaced by those whereby the welding flanges are turned back approximately 30 deg., to form positive groove for welding material.

(6) K.L.G. F. 12 type sparking plugs must be fitted.

(7) Chater Lea type socket terminals must be fitted on the H.T. cables at sparking plug ends and secured by K.L.G. spring clip.

The brass tubular "eyelet" terminal must not be used.

(8) The new pattern strengthened contact breaker rocker arm must be fitted. This is provided with fillets between web and lug for platinum contact.

(9) The material of the petrol valve seating of the carburettor must be of hard drawn brass and be of the new type giving a bearing surface increased by 100 per cent. over the old type, which was in gun metal.

2. The following modifications, (10 to 28), are desirable modifications which should be embodied whenever possible:—

(10) The nipple of the oil relief valve should be of new type with hole of reduced diameter in order to keep the pressure down in the low pressure system.

(11) The spring of oil relief valve should correspond to Drawing E. 14423.

(12) The rotor of the water pump should be of the type with straight vanes, the curved vane type should be replaced.

(13) Clearance between the rotor and body of the water pump should be increased to overcome the trouble of water freezing. The increase must be obtained by taking material off the pump body and not by reducing the rotor which would affect the efficiency of the pump.

(14) The fibre washers on cylinder studs underneath camshaft casing should be replaced by aluminium ones.

(15) The baffles for the camshaft casing rocker should be of a type with radiused edges to overcome oil leaks. Old type baffles with square edges should be replaced.

(16) The wrist pin, bolt and washer of the articulating rod should be replaced by the strengthened type, Parts Nos. E. 13982, E. 13985 and E. 13986. (Where these parts have already been changed by Messrs. Rolls-Royce the washer is stamped "A").

(17) Old type cylinders should be replaced by those provided with corrugated water-jacket.

(18) Dowel pins in crankcase for cylinders should be deleted on overhaul.

(19) The latest type of valve springs, Part No. E. 9905, should be fitted.

NOTE.—The compressed pressure is 33 lbs. against 47 lbs. with the old spring and the inside diameter is increased from 1.125 to 1.15 ins.

(20) The planet roller bearing should be of a type with 17 rollers and a parallel bore.

(21) The sun wheel carrier with bores reduced from 4.35 to 4.15 ins. made from special nickel steel, should replace any of the old type made from C.H.N.S.

(22) The friction damped epicyclic gear should be fitted.

(23) The steel collet of the propeller shaft should be replaced by one of phosphor bronze. (Applies to Engines Nos. 5716 and onwards only.)

(24) The aluminium split nut for camshaft drive housing should be replaced by the strengthened steel nut in one piece.

(25) The new type of condenser with strengthened lug for earth connection and condenser endplate altered to take same, should be fitted.

(26) A bakelite bush should be fitted in the rocker arm in place of the red fibre bush originally provided.

(27) The dust cover for the armature housing should be provided with security clip fitting against underside of the distributor bearing.

(28) Swages type of jet should be substituted for the earlier type having restriction soldered in position.

(No. 5 of 1925.)

Siddeley "Puma" Engines: Modifications

1. THE undermentioned modifications, (1) to (17), all of which have been individually established for several years, are considered essential and must be included in any "Puma" engine which does not already contain them before it is passed as airworthy:—

(1) A horizontal groove, 4 mm. wide and 5 mm. deep, should be provided in the bottom half of the big end bearing to come within 7.5 mm. of each end.

(2) The new type oil baffles should be fitted to decrease the oil consumption.

(3) Connecting rods with strengthened-up big ends must be fitted.

(4) A dowel must be provided in the big end bearings to prevent rotation

(5) Low compression pistons, compression ratio 4.95-1, are to be fitted.

(6) The new type of inlet valve outer spring to take load of 63½ lb. as against the original spring of 55½ lb. is to be fitted when high lift camshaft is used.

(7) The inlet valve with solid stem adjusted by cap is to be used when high lift camshaft is fitted.

(8) The following alterations must be embodied in the lubrication system:—

(a) Part No. 701-149.—Oil gallery nipple.—Hole to be opened out ¼-in. diameter.

(b) Part No. 701-145A.—Oil delivery pipe, from filter.—Pipe to be altered to ⅝-in. outside diameter.

(c) Part No. 701-33A/B.—Intermediate bearing (701-34A/B centre bearing).—Hole altered to ¼-in. diameter and countersink altered to "10 mm. dia. at 90°."

Position of oil groove in top half altered and groove extended round oil hole. Oil groove added in bottom half.

(d) Part No. 701-32A/B.—Front Bearings

(e) Part No. 701-35A/B.—Rear Bearing

(f) Part No. 701-74A.—Oil 3-way piece stud.—New part to be fitted.

As an alternative modification and in order to adapt the existing part, two holes ⅝-in. diameter can be drilled at right angles to the existing holes, one above and the other below these holes. The new holes must not be drilled right through but only to the centre.

(g) Part No. 701-148A.—Main oil gallery pipe.—Pipe to be increased to ⅝-in. external diameter.

(h) Part No. 702-1A.—Crankshaft.—Oil holes in Nos. 3, 5 and 7 journals are to be elongated at top.

(9) The oil pressure pipes to camshaft to be bent at the top and bottom ends, to run close and be bound to the oil drain pipe, by means of tape lagging, the tape being subsequently varnished.

(10) The following oil pipes are to be lagged with tape and varnished:—

701-77.—Crankcase thrust oil pipe.

701-78.—Oil pipe front.

701-145A.—Oil delivery pipe from filter.

701-148A.—Main oil gallery pipe.

(11) The vertical shaft coupling to be of the serrated type instead of hexagon.

(12) The material of the union and union nuts to be of gun-metal instead of aluminium to overcome stripping of threads.

(13) Narrow slots for the air passages in place of large drilled holes to be provided in the altitude control valve in order to limit the range of control and render the action more gradual. Or, alternatively, the altitude control must be rendered inoperative.

(14) Connecting rod on carburettor, interlocking vacuum control and throttle levers, to be removed.

(15) Slow running jets.—The number of petrol feed holes to be increased from two to four in order to obviate undue restriction in the petrol supply.

(16) Feed holes through needle seating to be increased from $\frac{1}{8}$ -in. to $\frac{3}{16}$ -in. diameter to increase the available petrol flow.

(17) The drilled holes from float chamber to the diffuser base to be increased from $\frac{1}{8}$ in. to $\frac{3}{16}$ in., in order to increase the petrol supply.

2. It is very desirable that all engines be fitted with two magnetos in place of one magneto and one Remy coil ignition set, and be fitted with new type oil base with increased radius to underside of flange securing sump to crankcase, to prevent cracking of flange.

3. The following modifications, (18) to (24), are desirable modifications which should be embodied whenever possible :—

(18) The diameter of the wire of locking ring of the gudgeon pin in piston should be increased from 14 to 12 G. and gudgeon pin shortened accordingly.

(19) The white metal of the big end bearing and connecting rod should be dove-tailed into the gun-metal casing, and the fitting of the big end bearing on to the connection rod should be tightened to prevent same working loose.

(20) Oil holes in camshaft and extension should be increased from $\frac{1}{16}$ in. to $\frac{1}{8}$ in. diameter, and a $\frac{1}{16}$ -in. diameter hole drilled through the shaft immediately behind the rear of No. 6 exhaust cam into camshaft bore.

(21) The camshaft bearing should be modified to take die-cast white metal bush.

(22) The new design rocking lever and pins should be fitted to eliminate number of wearing parts.

(23) Swaged type of slow-running jet should be substituted for the earlier type having restriction soldered into position.

(24) A small triangular notch, 5 mm. by 5 mm., should be cut in the leading edge on the top side of the throttle barrel, to obtain slow running.

(No. 6 of 1925.)

Corrigendum to Notice to Ground Engineers No. 6 of 1925

1. PARAGRAPH 1 (1) of the above-mentioned Notice to Ground Engineers should be amended to read as follows :—

"A horizontal groove, 4 mm. wide and 0.5 mm. deep, should be provided in the bottom half of the big end bearing to come within 7.5 mm. of each end."

2. Copies of the Notice in question should be altered accordingly.

Rolls Royce "Falcon III" Engine : Modifications

THE undermentioned modifications, 1 to 10, all of which have been individually established for several years, are considered essential, and must be included in any "Falcon III" engine, which does not already contain them before it is passed as airworthy :—

1. The planet expanding bolt in the epicyclic gear must

be replaced by new bolt Pt. No. G. 6196 together with nut, washer and cones.

2. Where two Watford 6-cylinder magnetos are fitted, they must be replaced by two B.T.H. 12-cylinder magnetos and strengthened platforms.

3. Shouldered studs, together with castellated nuts and split pins, must be used to secure the distributor rotor on the B.T.H. magneto.

4. A vent hole must be provided in the distributor bearing and the oil level raised.

5. A tab washer must be provided for locking the nut on the adjustable contact screw.

6. A special washer for locking H.T. insulator for distributor rotor must be provided to prevent the insulator unscrewing.

7. The gap between the main electrode on the distributor rotor and the distributor segments must be increased to 0.020 in., and that between the starting electrode and the distributor segments, to 0.030 in.

8. The approved type fittings must be provided when metal braided ignition cable is used.

9. K.L.G. F. 12 type sparking plugs must be fitted.

10. The material of the petrol valve seating of the carburettor must be of hard drawn brass and be of the new type, giving a bearing surface increased 100 per cent.

The following modifications, 11 to 23, are desirable modifications, which should be embodied whenever possible :—

11. Aluminium engine suspension brackets should be replaced by steel ones.

12. The fibre washers on cylinder studs underneath the camshaft casing should be replaced by aluminium ones.

13. Clearance between the rotor and body of the water pump should be increased to overcome the trouble of water freezing. The increase must be obtained by taking material off the pump body and not by reducing the rotor which would affect the efficiency of the pump.

14. The aluminium split nut for camshaft drive housing should be replaced by the strengthened steel nut in one piece.

15. The old type sleeve of camshaft casing stud should be replaced by one provided with a grooved shoulder to overcome oil leakage.

16. The wrist-pin, bolt, and washer of the articulating rod should be replaced by a strengthened type, Parts Nos. E. 16613-4 and E. 6234.

17. The release valve spring should be one made of 17 S.W.G., and should require a load of 5 lb. to compress to 0.755 in.

18. The free end of the reinforced contact breaker springs should be bent inwards slightly in order to prevent chafing at this point.

19. The distributor gear wheel should be balanced with distributor rotor in position by drilling $\frac{1}{8}$ -in. diameter hole in web.

20. The low-tension connection between the condenser and the contact breaker should be fitted above the condenser clip with a split pin for further security.

21. The aluminium timing lever on contact breaker housing should be replaced by one of brass, as the former is easily fractured.

22. H.T. cable ends should be provided with special thimbles at magneto end in order to provide a better and more secure connection.

23. The swaged type of slow-running jet should be substituted for the early type having the restriction soldered in position.

(No. 4 of 1925.)

Air Mails to Russia, etc.

THE Postmaster-General announces that on and from Monday, June 29, letters, etc., may be posted for transmission by a new air mail serving Russia, Finland, Esthonia, Lettonia (Latvia), Lithuania, and Memel Territory. The mail will be closed at the G.P.O., London, at 6.15 a.m. each weekday for conveyance by air to Berlin and thence by night train to Königsberg, in time to connect with air services next morning from Königsberg to (a) Memel, Riga, Reval and Helsingfors, (b) Smolensk and Moscow. The total time of transit from London to Helsingfors or Moscow should, given regular flights, not exceed 36 hours, and to the other places mentioned should be less. By ordinary mail the time of transit from London to Helsingfors or Moscow is about 4½ days. The special fee payable (in addition to ordinary foreign postage) will be 8d. per ounce on letters, etc., for Russia, and 6d. per ounce on those for Finland and the other East Baltic countries.

Air Force Allowances

UNDER revised rates of pay, which have been approved for the Royal Air Force serving in India, all married officers over the age of 34 will receive higher rates than unmarried officers; free quarters or a cash allowance will be given; 100 per cent. increase will be made in the mess allowance; and a separation allowance when families cannot reside in an officers' station.

An Air Station for Aldershot

AN early start is to be made with the proposed air station for the Aldershot Command by means of which it is intended securing close co-operation between aeroplanes and troops. A 400 acres site has been chosen at the western boundary of the War Department land near Odiham, 9 miles from the main camp in Stanhope Lines. The unit to occupy the new station will be an Army Co-operative Squadron, R.A.F.



Married

Flight-Lieut. HUGH MITCHELL KIRKWOOD BROWN, R.A.F., son of Mr. and Mrs. John Brown, Newhouse Villas, Stirling, was married on June 17 at Whinfield, Stirling, to MOLLY, youngest daughter of Mr. DAVID and the late Mrs. M'AREE, Whinfield, Stirling.

To be Married

A marriage has been arranged, and will shortly take place, between CHARLES FRANCIS ABELL, O.B.E., late R.A.F., and CLAIRE ADELE MOORE, youngest daughter of the late William Roger and Mrs. Moore, of 9, Westbourne Terrace Road, W.2.

The engagement is announced between Flight-Lieut. JAMES H. BUTLER, R.A.F., eldest son of Mr. and Mrs. Charles Butler, of Mount Leinster House, Borris, Carlow, and MARGUERITE K. L., only child of Mr. and the late Mrs. JOHN HALE, of Pond Park, Lisburn.

The engagement is announced between Mr. CHARLES H. DIXON, M.C., R.A.F., eldest son of Mr. and Mrs. W. H. Dixon, Hillfield, Sawbridgeworth, Herts, and VERA, only

daughter of Mr. and Mrs. O. HIRSCH, 15, Lymington Road, N.W.6.

The engagement is announced between JOHN SYDNEY HUGHES (late R.A.F.) and HENRIETTA ALINE STUBINGTON, youngest daughter of the late Mrs. H. T. Stubington, The Priory, Westward Ho.

The marriage between G. W. R. RUSSELL, R.A.F., elder son of Mr. J. J. Russell, High Sheriff of Co. Louth, and Mrs. Russell, of Ballygasson House, Dunleer, and Priorland House, Dundalk, and CATHERINE MARY, only daughter of Alderman ROBERT PATTINSON, J.P., of Southfields, Ruskington, will take place at Ruskington on July 23.

The marriage arranged between Mr. ROBERT DARLEY WHELAN, R.A.F., and Miss BARBARA WREY will take place on Wednesday, August 12, at All Saints' Church, Brenchley, at 2 p.m.

Killed

Flying Officer NORRIS CARDEN BRETHERTON, who died on June 21, as the result of an aeroplane accident at Peshawar, was the fourth son of the late Rev. H. W. Bretherton and Mrs. Bretherton, of Eccleston Rectory, Chorley, Lancashire. His age was 25.

R.A.F. Flying Accident

THE Air Ministry regrets to announce that as a result of an accident at Abu Sueir to a D.H.9A of No. 4 Flying Training School, Abu Sueir, on June 26, Pilot Officer Daniel Geoffrey Wilson, the pilot of the aircraft, and No. 330805 L.A.C. Charles Willey Gamage were killed.

Death of Dr. Graeme Anderson

WE regret to announce the death, which occurred while playing tennis on June 28, of Dr. Graeme Anderson, who was a pioneer in R.A.F. surgery and who did much research work in this connection. He was the author of several books on surgery, the most important of which was "The Medical and Surgical Aspects of Aviation." Dr. Anderson had his whole heart in his profession, and it was anticipated that he would

rise to an eminent position. The funeral will take place today (July 2) at 12 noon at Kensal Green Cemetery, at which Air Commodore Munro will represent the R.A.F. A service, conducted by the Rev. Dr. Fleming, will be held at St. Columba's Church, Pont Street, S.W., at 11 a.m.

Mr. Shackleton Ill

HIS many friends will learn with regret that Mr. W. S. Shackleton has had to undergo an operation and is at present in a nursing home. The operation was entirely satisfactory and Mr. Shackleton is progressing as well as can be expected. He will, however, necessarily be absent from duty for some time and will not be able to deal with his correspondence for the present. We are sure Mr. Shackleton's friends will join us in wishing him a speedy recovery.



A NEW ENGLISH ELECTRIC COMPANY FLYING BOAT: The Ayr Napier-engined Flying Boat is remarkable for the fact that it has no wing tip floats, the bottom plane doing all, and performing the functions of side floats, the inner portion of it being submerged when the machine is at rest on the water. This machine, like all other of English Electric Company construction was designed by Mr. W. O. Manning. The engine is a 450 h.p. Napier "Lion."

THE ROYAL AIR FORCE

London Gazette, June 23, 1925.

General Duties Branch

Flight Lt. C. F. Toogood is granted a perm. commn. in rank stated (June 24). The follg. Pilot Officers are promoted to rank of Flying Officer (June 19):—J. E. Gray-Hill Thomas, C. C. Edwards. Flying Offr. L. W. Thres, D.F.C., is transferred to the Reserve, Class A (June 24). Flying Offr. H. E. Power (Lt., E Surrey R.), relinquishes his temp. commn. on return to Army Duty (June 9). The short service commns. of the follg. Pilot Officers on probn. are terminated on cessation of duty (June 24):—C. M. Inglis, H. M. Bason, A. F. Satchwell.

Reserve of Air Force Officers

The follg. are confirmed in rank:—FLYING OFFRS.—A. R. Turpin (May 27); A. M. Mackay (June 16); H. S. Eaton, E. C. Gordon, L. W. Norman, H. J.

Price, T. Terrell, D.S.C., C. Thomas (June 23). PILOT OFFRS.—C. S. Clarke, L. H. A. Fray, H. G. Harper, G. J. Holdcroft, J. Paterson, J. J. Burchett Rutter (June 23).

Pilot Offr. C. L. Atkinson is transferred from Class C to Class A (June 19); Pilot Offr. J. H. Taylor is transferred from Class A to Class B (May 15); Flying Offr. L. F. Cubitt is transferred from Class A to Class C (June 23). The commn. of Flying Offr. on probn. J. E. Sitch is terminated on cessation of duty (Feb. 15).

Memoranda

The permission granted to Sec. Lt. C. H. Jehan to retain rank is withdrawn on his enlistment in the Territorial Army; T. L. M. Meares resigns the rank of Lt., permission to retain which was granted to him by Gazette dated Aug. 30, 1921.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Flight Lieutenants.—R. Jope-Slade, D.S.C., to R.A.F. Depot, on transfer to Home Establ.; 27.5.25. P. C. Wood, to R.A.F. Base, Leuchars; 8.6.25. F. H. Coleman, to No. 30 Sqdn., Iraq; 3.6.25. A. W. Symington, M.C., to Inland Water Transport, Iraq; 14.5.25. M. Ballard, to No. 6 Armoured Car Co., Iraq; 24.5.25. G. G. Dawson, to No. 24 Sqdn., Kenley; 6.7.25. G. F. Smylie, D.S.C., to R.A.F. Depot on transfer to Home Establ.; 5.6.25. D. C. Ballfour, to R.A.F. Depot on transfer to Home Establ.; 22.5.25.

Flying Officers.—S. G. Williams to Elec. and Wireless Sch., Flowerdown; 10.5.25. (Hon. F./Lt.) L. W. H. Phillips, to H.M.S. "Hermes"; 8.6.25. J. Messer-Bennetts to R.A.F. Depot on transfer to Home Establ.; 31.5.25. R. V. Bramwell-Davis to Stores Depot, Iraq; 14.5.25. G. E. Newton to No. 15 Sqdn., Martlesham Heath; 22.6.25. W. F. Warner, to No. 216 Sqdn.,

Egypt; 4.6.25. T. Fetherstonhaugh, to Aircraft Depot, India, instead of to No. 28 Sqdn., as previously notified; 1.2.25. F. G. Cator, to R.A.F. Depot, on transfer to Home Establ.; 30.5.25. A. H. D. Livock, to Aircraft Depot, India, instead of to No. 20 Sqdn., as previously notified; 1.5.25. H. C. Black, to R.A.F. Depot; 23.6.25. J. R. Wolley, to No. 20 Sqdn., India; 22.3.25. (Hon. F./Lt.) E. L. O. Baddeley, to No. 5 Sqdn., India; 26.5.25. (Hon. F./Lt.) U. C. de Burgh, to R.A.F. Cadet Col.; Cranwell, 29.6.25. (Hon. F./Lt.) W. H. Vetch, to No. 28 Sqdn., India; 15.4.25. E. T. St. M. Brett, to No. 45 Sqdn., Iraq; 4.6.25. L. Martin, to C. and M. Party, Cattewater; 1.5.25. M. H. Garnons-Williams, to H.M.S. "Eagle"; 20.6.25.

Stores Branch

Flight Lieutenant.—R. Adams, to the Packing Depot, Ascot; 15.6.25.

Flying Officers.—A. S. Berry, to Aircraft Depot, India; 4.3.25. A. J. Redman, D.F.C., to C. and M. Party, Cattewater; 1.5.25.

IN PARLIAMENT

India and Air Communications

SIR HARRY BRITAIN, on June 22, asked the Under-Secretary of State for India whether, in view of the desire to establish air communications with India in the shortest possible time, he is able to state that the Government of India is collaborating fully with the Air Ministry in making arrangements for landing grounds and other necessary requirements?

Earl Winterton: I am glad to be able to inform my hon. Friend that the Government of India are collaborating fully with the Air Ministry in connection with the establishment of air communications with India.

Royal Air Force, Kenley Aerodrome (Low Flying)

CAPT. GARRO-JONES, on June 24, asked the Secretary of State for Air, in view of the facts that local residents have protested to the officer commanding Kenley Aerodrome against the amount of low flying that is carried on over their houses, and that two flying officers have already lost their lives by crashing into a house in that neighbourhood, in what respect Kenley Aerodrome is indispensable for low-flying practice, while fully equipped and more remote and rural air stations are available?

Sir Samuel Hoare: The situation of Kenley Aerodrome is of great importance in relation to the air defences of the country and it is essential that active use should be made and experience gained of the aerodrome. It would not be satisfactory to have the training of the units allotted to this station carried out elsewhere, even if there were, which there is not, another station available for the purpose. As stated in my reply on June 17, all avoidable low flying is prevented, and the low flying which does take place is inevitable in the normal training of service squadrons.

Airships and Experiments

MR. VIANI asked the Secretary of State for Air, in view of the fact that the R.33 had been expressly reconditioned for the purpose of obtaining certain data affecting design, and that in her experimental flight on April 6 last the proper tests could not be carried out because the scientific instruments were not recording with accuracy, and the essential data sought have not yet been obtained, whether the Air Ministry are proceeding with the reconconditioning of R.36 and the building of the two giant airships, or are delaying the work on these ships until the R.33 is repaired and these essential tests carried out?

Sir S. Hoare: It is not considered necessary to delay the reconconditioning of the R.36, which has already flown successfully, until the data affecting design are obtained from the aeronautical trials of R.33. As regards the two new airships, much of the design work can be proceeded with in advance of these trials and no instructions have, therefore, been given for the work to be delayed. It is not, however, intended that the final design of the Air Ministry ship shall be completed until the data from full scale trials are available.

Airship Route to India

MR. VIANI asked the Secretary of State for Air if, on the route to India, the State airships will follow more or less a definite trade route or whether they will take advantage of favouring winds and take the route dictated by the meteorological conditions prevailing at the moment?

Sir S. Hoare: Under the present scheme of airship development, which includes trial flights by both airships to India, a mooring mast is being erected in Egypt and a mooring mast and shed at Karachi. In the flights between England and Egypt, and Egypt and Karachi, the utmost advantage will naturally be taken of favouring winds and other meteorological conditions.

R.A.F. Parachute Accident

MR. VIANI asked the Secretary of State for Air if the particular parachute which failed to open and save the life of Corporal Wilson had been previously tested, and, if so, by what method; if the parachute has been examined since the tragedy; and if any facts have emerged to prove whether the airman did or did not at any time pull the cord?

Sir S. Hoare: As regards the first part of the question, the parachute referred to had been tested by being twice dropped, with a weight attached, from an aeroplane; it had also been used for 12 practice parachute jumps prior to the accident. As regards the second and third parts, the examination of the parachute, which took place immediately after the accident, showed that the late Corporal Wilson had failed to pull either the main or the emergency ripcord and that the parachute was in perfect working order.

Air Communications and Australia and New Zealand

SIR H. BRITAIN, on June 25, asked the Secretary of State for Air whether the Australian and New Zealand Governments have been approached,

and, if so, with what results, with regard to the linking up of these two Dominions and Great Britain by means of an air service.

Sir P. Sassoon: In accordance with the recommendations of the Air Communications Committee of the Imperial Economic Conference, 1923, the Dominion Governments have been informed of the position of the airship scheme and, in general, of all developments affecting civil aviation. The question of approaching the Australian and New Zealand Governments in regard to the linking up of those countries and Great Britain by an air service will be taken up when the experimental stage of the airship programme is further advanced.

Mr. T. Williams: Are we to understand that, when the various Empire Governments have made these communications possible, we are then going to hand them over to private enterprise and thereby create a vested interest in what should obviously be a national concern?

Sir P. Sassoon: No, I do not think the hon. member is entitled to draw that conclusion.

Odiham Aerodrome

LORD H. CAVENDISH-BENTINCK asked the Secretary of State for Air whether it has been possible to find any site in the neighbourhood that will obviate the withdrawal from arable cultivation of 400 acres near Odiham; and what is the estimated time of flight by an aeroplane from Aldershot to Odiham and Stockbridge respectively?

Sir S. Hoare: I regret that it has not been found possible to find an alternative site to Odiham. As regards the second part of the question, the estimated time of flight from Aldershot to Odiham is eight minutes, and from Aldershot to Stockbridge 36 minutes, whilst the distances by road are about 9 miles and 40 miles respectively. I would, however, point out that the distance by air from the Army units with which it is to co-operate is not the only factor governing the location of an Army Co-operation Squadron such as that which it is intended to station at Odiham; if co-operation is to be effective, accessibility by ordinary means of ground transport is also of the first importance.

R.A.F. Officers' Training (Iraq and India)

SIR F. SYKES, on June 26, asked what charge, if any, is made against the Governments of India or Iraq for training costs and gratuity liability in respect of short-service commissioned flying officers employed in those countries; and what is the estimated average cost of such training and gratuity expenditure?

Sir S. Hoare: The cost of the Royal Air Force in Iraq is chargeable to Imperial funds and no recovery is effected, therefore, from the Iraq Government in respect of the cost of the items referred to by my hon. and gallant friend. As regards India, the *per capita* contribution towards the cost of training, etc., of the Royal Air Force supplied for the Indian Establishment and for non-effective services has not yet been fixed, and is at present under investigation. Advances on account are being made in the meanwhile. It is not possible at present, therefore, to state the amount which the Indian Government will eventually contribute in respect of these services.

Short-Service Commissions

SIR F. SYKES asked how many short-service commissions in the Royal Air Force have been granted; how many officers holding such commissions have been granted permanent commissions; how many, in addition, are still serving on the active list; and how many are on the Reserve of Air Force Officers and qualified and fit for pilot duties?

Sir S. Hoare: The answer to the first part of the question is 2,098; to the second, 408; and to the third part, 1,191. These figures include commissions granted in all branches of the Service. As regards the last part, the number of officers in the Reserve who previously held short-service commissions and are qualified and fit for pilot duties is 127, of whom 82 are in regular flying practice and immediately available.

Sudan-Lake Chad Air Flight

SIR F. SYKES asked whether it is still intended to undertake a flight from the Sudan to Lake Chad; what is the estimated cost of the flight; and if it is intended to maintain permanent flight facilities along the route?

Sir S. Hoare: The answer to the first part of the question is in the affirmative. As regards the second part, it is not possible as yet to give a close estimate of the cost of the flight. As regards the last part, the only permanent flight facilities which will be maintained are those already in existence in the Sudan.

R. 38 MEMORIAL TABLET

ON June 29, the American Ambassador, Mr. A. B. Houghton, unveiled a tablet, which has been placed in the Library of the Royal Aeronautical Society, to the memory of the British and Americans who lost their lives in the disaster to the airship R. 38 (Z.R. 2) over the Humber on August 24, 1921. The R. 38 was originally designed in 1918 for war purposes with the British Navy, but when it was decided to close down all experimenting with airships early in 1921, the half-completed airship was sold to the U.S. Navy, who renamed her "Z.R. 2." She was completed in June, 1921, when she made two trial flights from her constructional shed at Cardington before proceeding to Howden in Yorkshire for final trials prior to acceptance by the American Government. On her fourth and last flight, she was manned by a mixed crew of Royal Air Force and U.S. Navy officers and men, and also carried civilian representatives of the design staff and of the research staff at the National Physical Laboratory. At 5.37 p.m., on August 24, she broke her back while carrying out rudder tests and fell into the Humber in two portions, only four of the occupants being saved.

The Council of the Royal Aeronautical Society had viewed with concern the stoppage of British airship development, and therefore decided to raise a fund with the dual purpose of providing a memorial tablet in the Library of the Society (which had numbered several of the crew among its members), and of stimulating the continuance of interest in airship research and progress.

The memorial tablet, designed by Mr. Paul Cooper, records the names of all those lost, under the appropriate Shields of the Royal Air Force, U.S. Navy, Institute of British Naval Architects and National Physical Laboratory, and bears the simple inscription: "To the Memory of those who died in H.M. Airship R. 38, which failed and fell August 24th, 1921."

Lieut.-Col. Tizard, Chairman of the Royal Aeronautical Society, referred to the fact that the loss of the R. 38 had seemed to destroy the faith of many people in airships, but that the faith of members of the R.Ae.S. had remained unshaken. Already public opinion was swinging back, and a small body of experts had been entrusted with the task of regaining what was lost with the R. 38.

The American Ambassador then unveiled the memorial, but made no speech.

Professor L. Bairstow thanked the American Ambassador for unveiling the memorial, and said the men of the R. 38 were entitled to rank with Franklin and Scott as pioneers. He referred to the things which the airship promised to make possible, and said that although the tale of misfortune might not yet be all told, he believed that progress of research would guard against a repetition of an accident like that which resulted in the loss of the R. 38.

It is of interest to note that present at the unveiling of the memorial were the two survivors of the R. 38 disaster, i.e., Mr. H. Bateman, of the N.P.L., and Corporal W. A. Potter. Amongst those present were: Admiral McNamee (United States Navy), Air Vice-Marshal Sir Sefton Brancker (Director of Civil Aviation and Chairman-elect of the Council of the Society); Major Davidson (United States Embassy's Military Staff), and two of the survivors (H. Bateman, representative of the National Physical Laboratory, and Corporal W. A. Potter); Commander J. C. Hunsaker and Commander Towers (United States Embassy's Naval staff); Sir Eustace Tennyson-d'Eyncourt; Sir Malcolm Fraser; and Major C. H. Scott (who piloted R. 34 to America and back).

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

Anglo-Indian Survey Flights

A LIMITED number of letters were carried by Alan Cobham on various stages of his notable flight from London to Rangoon, and return, and as in many cases these numbered only 30 or 40, some are calculated to prove scarce. The stages Calcutta-Akyab; Akyab-Rangoon, and Rangoon-Akyab-Calcutta are denoted by dated postmarks only, in addition to the initials of the pilot, but on the return flight from Calcutta to Karachi a triangular cachet in reddish purple was applied to the 68 letters and 32 cards carried, which contained the following wording: "Anglo-Indian Air Survey—Calcutta to Karachi by Aeroplane D.N. 50 1924-1925." For the final lap "London" replaced Karachi in the inscription, letters being postmarked on arrival at Waddon Aerodrome on March 17, 1925. For the foregoing particulars we are indebted to the *Air Post Bulletin*.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (London Aero-Models Association)

ON Saturday, July 4, the following competitions will be held on Wimbledon Common at 3.30 p.m.:—

1. Gamage Cup (Open Competition for any type of model).

Formula: Duration $\times \sqrt{\text{loading}}$.

2. Sir John Shelley Cup (Duration Competition for power-models, excluding rubber).

A. E. JONES, Hon. Secretary.

PUBLICATIONS RECEIVED

Luft-Hansa Luftpolitische Möglichkeiten. By Fischer v. Poturzyn. Werner Lehmann Verlag, Leipzig.

Rendiconti Tecnici della Direzione Superiore del Genio e delle Costruzioni Aeronautiche. May 15, 1925.—Commissariato dell' Aeronautica, Via della Lungara 9-10, Rome. Price L. it. 40.

Caratteristiche Aerodinamiche di Ali. Fascicolo II. Supplemento ai Rendiconti Tecnici. May 15, 1925.—Commissariato dell' Aeronautica, Via della Lungara 9-10, Rome.

Notiziario di Aeronautica. No. 5. May, 1925.—Commissariato dell' Aeronautica, Via della Lungara 9-10, Rome. Price, L. it. 50.

Official Guide to the British Empire Exhibition, 1925.—Fleetway Press, Ltd., Dane Street, High Holborn, W.C. Price 1s.

How to Drive a Car. By the Editor of *The Motor*.—Temple Press, Ltd., 7-15, Rosebery Avenue, London, E.C. Price 2s. 6d. net.

The Air Pilot Monthly Supplement. No. 8. June, 1925.—H.M. Stationery Office, Kingsway, London, W.C. 2.

Le Rotor, Instrument a Progrès. En Marge du "Flettner-Rotor." By B. A. Chait. "Anvers-Bourse," 85, Marché Saint-Jacques, Antwerp.

Cambridge Automatic Temperature Regulators. Cambridge Instrument Co., Ltd., 45, Grosvenor Place, London, S.W. 1.

L'Annee Aeronautique, 1924-1925. By L. Hirschauer and Ch. Dollfus. Dunod, 92, Rue Bonaparte, Paris.

Department of Overseas Trade. Report on the Economic Situation of Denmark, January, 1925. By R. M. A. Turner. H.M. Stationery Office, Kingsway, London, W.C. Price 1s. 6d. net.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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- 4,748. D. J. MOONEY. Ribs, cross members, etc. (234,878.)
5,121. D. J. MOONEY. Structural members. (234,881.)
5,592. A. H. R. FEDDEN, L. F. G. BUTLER and BRISTOL AEROPLANE CO., LTD. Valve-gear of i.c. engines. (234,900.)
6,788. D. NAPIER AND SON, LTD., and G. S. WILKINSON. Variable-pitch propellers. (234,937.)
14,070. G. RIETTI. Aircraft. (217,588.)
23,282. W. BEARDMORE AND CO., LTD., and J. H. HURST. Production of metal wheels. (235,065.)
29,559. CIE. D'APPLICATIONS MECANQUES. Brakes. (226,524.)

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